Vol. 9. No. 11 pp. 749-812. November, 1939

THE VETERINARY BULLETIN

1939

WEYBRIDGE :
IMPERIAL BUREAU OF ANIMAL HEALTH
WEYBRIDGE, SURREY
ENGLAND

Price 5/- net Annual Subscription £2

Imperial Agricultural Bureaux.

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IMPERIAL BUREAU OF ANIMAL HEALTH

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VETERINARY BULLETIN

Vol. 9.] November, 1939. [No. 11.

DISEASES CAUSED BY BACTERIA AND FUNGI

I. Sanders, G. P. (1938). **Methods of Determining Chlorine in Milk and their Application in the Detection of Mastitis.**—*J. Dairy Sci.* **21.** 153-154.

II. Meigs, E. B., Converse, H. T., Burkey, L. A., Rogosa, M., & Sanders, G. P. (1938). **The Relation of Milking Machines to the Incidence of Mastitis.**—*Ibid.* 165-166.

III. Burkey, L. A., Meigs, E. B., Sanders, G. P., & Rogosa, M. (1938). **Some Factors Affecting the Resistance of Animals to Mastitis.**—*Ibid.* 124-125.

IV. Carlson, E. R. (1939). **Potassium Permanganate Reduction Test for Mastitis.**—*Vet. Med.* **34.** 160-161.

V. Smith, F. R., & Mudge, C. S. (1939). **Serological Studies on Mastitis.**—*Proc. Soc. exp. Biol., N.Y.* **40.** 45-48. 1 table. [6 refs.]

I. A method of determining the chlorine percentage in milk is described and is stated to be simple and accurate. Quarter samples (since bulk samples were unsatisfactory) from 29 cows through more than one lactation were examined, and are said to have shown that all values of over 0·15% indicated mastitis positive cows and that all over 0·12% were suspected or positive. (It is not stated whether bacterial tests were used to control the chemical tests).

II. A herd of hand-milked cows was divided into three. Some continued to be milked by hand and these remained normal as to milk yield, leucocytes, chlorides and bacteria. Of the other two divisions one was milked by machine using high pressures and stripped while the machine was still on; these showed a high leucocyte count within a few days followed by increase in chlorides, reduction of yield and appearance of bacteria, followed by acute mastitis. When hand-milked again these animals recovered. The other division was milked by the same machine but at a lower vacuum and stripped by hand. These did not suffer from acute mastitis though the leucocyte count and the chlorine were increased. It is argued that machine milking may cause injury to the secretory tissues of the udder.

III. The effect of the number of leucocytes in the milk, its germicidal properties and the inhibitory action of blood on *Streptococcus agalactiae* was studied. Increase in leucocytes indicates injury but not necessarily infection. The germicidal properties increase in direct relationship to the disease until the acute stage when they decrease. Blood serum inhibits the growth of *Str. agalactiae* in milk from the same cow but not in milk of another cow. This inhibition is not found in serum stored for four days or in serum from a cow suffering from acute mastitis.

IV. Potassium permanganate is used to indicate the increased reduction properties of abnormal milk. The test is performed by adding either 1 ml. of M/40 aqueous solution of potassium permanganate to 5 mls. of fore milk or 1 ml. of M/200 solution to 1 ml. of fore milk. A colour range relating to the various values is given.

V. Sera from cows in two herds were collected and tested for agglutinins and precipitins against a *Str. agalactiae* strain isolated from herd I. A large number of the cows in this herd reacted positively but no attempt was made to correlate these reactions with bacteriological examinations. The sera from herd II were uniformly negative.—P. S. Watts.

Little, R. B. (1938). **The Significance of Human Double Zone Beta Hemolytic Streptococci in the Udder of the Cow.**—*J. exp. Med.* **68.** 905-911. 2 tables, 2 charts. [10 refs.]

Human strains of double zone beta-haemolytic streptococci were introduced, *via* the teat canals, into the udders of 4 first-calved cows which were kept under good hygienic conditions, fed on a full milking ration and milked twice daily at evenly spaced intervals.

Mastitis was induced in 11 quarters. The infection persisted in 5 quarters whilst the other 6 quarters recovered from the infection at varying periods. This and comparative tests with bovine strains show that, while human strains can infect the udder, they do not persist like bovine strains.—H. E. Bywater.

Brooks, P. B. (1939). **Streptococcic Mastitis and Public Health.**—*J. Amer. vet. med. Ass.* **94.** 11-17. 2 figs.

A review of the existing knowledge concerning organisms responsible for milk-borne outbreaks of septic sore throat and scarlet fever.—H. E. Bywater.

Peterson, E. H., & Hastings, E. G. (1939). **A Study of the Possible Relationship Between Non-Specific Mastitis and Streptococcic Infection of the Bovine Udder.**—*Cornell Vet.* **29.** 11-24. 3 plates. [Numerous refs.]

The authors have dealt only with the chronic subclinical form of streptococcal mastitis. They emphasize the difficulty of transmitting chronic streptococcal udder infection to normal udders under natural conditions. They therefore suggest that chronic streptococcal mastitis is a product of two distinct agencies, namely the primary fibrotic lesions produced by a non-specific affection, and the complications brought about by the secondary invasion of the streptococci. Pathological findings which they record are considered to support this view.

Experiments on ten cows with abnormal udders showed that infection with streptococci was readily attained by means of small glass rods previously dipped into broth cultures and inserted up the teat canal. These infections gave every indication of being permanent.—R. Isherwood.

Stewart, D. F. (1938). **Capsulation "Diffusion Factor" and Serological Behaviour of Group-B Streptococci** (*Str. agalactiae*).—*Aust. vet. J.* **14.** 180-183. [7 refs.]

Working with three strains of Group B streptococci (serological types 1d, 3c and 6a respectively) obtained from cases of bovine mastitis, S. found that some Group B strains produce a "diffusion factor", similar to that described by Duran-Reynals, for some streptococci and staphylococci. Using the capsule stain of Lyons some strains also appeared to be capsulated. He was unable to establish any correlation between capsulation and the production of a "diffusion factor",

or between capsulation and the serological behaviour of 45 strains tested by slide agglutination. He concludes that the apparent capsulation of Group B streptococci when examined by the method of Lyons is probably false. Previous attempts to demonstrate capsulation by Hiss's or Muir's methods had given entirely negative results.—T. S. Gregory.

Patto, O. (1938). Antitoxina e septicemia experimental estafilococicas. [**Choice of Antigens for Producing Staphylococcal Antitoxin**].—*Bol. Inst. Vital Brazil.* No. 20. pp. 17-20. 2 tables. [20 refs.] [English summary].

During the course of experiments with diphtheria antitoxin, P. compared the efficacy of the following antigens in experimental sheep :– (a) alum toxoid 1%, (b) tapioca toxin, (c) charcoal toxin 0·4% and Indian-ink toxin 1%, (d) emulsion of haemolytic staphylococci killed at 60°C., and (e) pure toxin. The alum toxoid was found to be superior to the others. Rabbits possessing natural antibodies were particularly resistant to artificial infection.—J. Pasfield.

Suarez, E. H., & Armijo, E. R. (1936). Estudios sobre carbunclo. I.—La enfermedad experimental. [**Anthrax. I. Experimental Infection**].—*Rev. Inst. bact. Chile.* **5.** No. 3/4. 3-16. 11 tables. [5 refs.] [English and French summaries].

Following a series of experiments on subcutaneous inoculation with anthrax culture, the authors conclude that the bacterial invasion has two phases. The first is due to the absorption of a number of bacilli which are destroyed by phagocytes. This gives rise to a transient septicaemia, enlargement of the spleen and liver, and an occasional positive reaction to the Ascoli test. The second phase sets in after 18-20 hours, and is brought about by the spreading of bacilli from the oedema at the site of infection. These bacilli are fully pathogenic, and attack with a virulence which overwhelms the cell defences and causes death. Septicaemia was demonstrated within 16-20 hours, and a precipitin, detected by the Ascoli reaction, appeared in strict parallelism with the course of the septicaemia. A second series of experiments, some by intraperitoneal and some by intravenous injection was carried out. Two groups of experimental animals were inoculated, one with culture, and the other with bacilli removed from a local lesion. The usual course was demonstrated in the first group. Death occurred, with the presence of oedema, within 25-30 hours. In the second group, death occurred within 12-14 hours, without oedema, septicaemia being present from the outset.

In the authors' opinion, anthrax culture has only potential pathogenicity ; there is a period of about 16-18 hours in which mutation to full virulence takes place in the animal medium, preferably in the skin.

I. —. (1938). **Tuberculosis (Attested Herds) Scheme, 1938. [Great Britain].** pp. 16. London : Ministry of Agriculture. [8vo].

II. —. (1938). **Tuberculosis (Attested Herds) Scheme, 1938. [Great Britain]. Explanatory Memorandum.** pp. 4. London : Ministry of Agriculture. [8vo].

III. —. (1938). **Ministry of Agriculture and Fisheries : Register of Attested Herds under the Tuberculosis (Attested Herds) Scheme [Great Britain].** pp. 80. London : Ministry of Agriculture. [4to].

I. This scheme was made by the Minister of Agriculture and Fisheries in accordance with Section 20 of the Agriculture Act, 1937 [*V. B.* **8.** 395.], to encourage the establishment in Great Britain of cattle herds officially certified

free from TB. Details are given of the conditions under which a certificate of attestation will be granted, continued in force, or revoked, and under which the Ministry of Agriculture will give financial assistance towards the cost of tuberculin tests. Two schedules indicate the rules to be observed; the first deals with those which apply after attestation, and the second with those applicable during the qualifying stages. Owners of attested herds receive either a bonus on milk sold or a *per capita* payment on all cattle in the herd.

II. The explanatory memorandum gives an outline of the scheme indicating its object and scope, the financial assistance available, the bonus payable after attestation and the rules to be observed.

III. This register, dated 30th June, 1938, gives a list of stockowners whose herds are attested under the Tuberculosis (Attested Herds) Scheme (Great Britain), together with particulars of distribution of such herds and a table of markets authorised for special sales of attested stock.—J. C. WALLACE.

FRANCKE, G., & PROFÉ, O. (1938). Zur Bekämpfung der Rindertuberkulose. [**Control of TB. in Cattle**].—*Tierärztl. Rdsch.* **44.** 565-571.

The serious loss due to TB. in Germany is emphasized, and stricter methods of control demanded. No new facts are reported.—P. S. WATTS.

SCHMIDT, H. W. (1938). Tuberkulose beim Reh. [**Tuberculosis in the Roe Deer**].—*Dtsch. tierärztl. Wschr.* **46.** 482-485.

P.M. examination of an 8-year-old roe deer dying of TB. showed that the disease was generalized throughout the body. The causal strain was identified as of the bovine type.—P. S. WATTS.

BACANU, C. (1938). Recherches sur la tuberculose congénitale du cobaye. Le passage du bacille de Koch à travers le placenta. [**Congenital Tuberculosis in G. Pigs. Passage of Tubercle Bacilli Through the Placenta**].—*C. R. Soc. Biol. Paris.* **129.** 1018-1020. [2 refs.]

Six female g. pigs in the third week of gestation and four in the seventh week were inoculated intravenously with 0·001 mg. of human tubercle bacilli, and the injections were repeated until all had aborted. The organs of the twelve still-born foetuses obtained from the first group were removed aseptically and the suspensions injected into 24 g. pigs. These later all gave positive tuberculin reactions but, at autopsy six months after inoculation, tubercle bacilli were recovered from only two, each of which had been injected with the organs of a foetus from a different female g. pig. The seven surviving progeny obtained from the second group of female g. pigs reacted positively to tuberculin, but at autopsy no tubercle bacilli could be recovered from the spleens, which were hypertrophied. B. concludes that the placenta is permeable to tubercle bacilli under certain conditions, especially when infection has occurred at an early stage of gestation, but that transmission takes place in the filtrable form, since no typical tuberculous lesions were found in either still-born or living foetuses.—R. O. MUIR.

PETRAGNANI, G. (1939). Nouvelles recherches sur la fréquence du bacille bovin dans la tuberculose humaine en Italie. [**Incidence of Bovine Bacilli in Cases of Human Tuberculosis**].—*Bull. Off. int. Hyg. publ.* **31.** 81-82.

The type of infection in 564 cases of human pulmonary TB. in a sanatorium at Rome was determined by culture on Petragnani's media and by g. pig and rabbit inoculation. Bovine type infection was thus diagnosed in 4 cases only.—J. E.

MOERKE, Georgine A. (1939). **An Enzyme of the Tubercle Bacillus.**—*Biochem. J.* **33.** 435-442. [10 refs.] [Author's summary copied *verbatim*].

Various experiments have been described wherein the human type of tubercle bacillus or a product of its growth was found to catalyse the oxidation of various phenolic substances. The properties of the active agent concerned in this catalysis, as observed under the conditions employed, suggest the formation of a diffusible, thermostable enzyme of the polyphenol oxidase type, whose behaviour is more consistent with catechol- than with phenol-oxidase, and which is not a tyrosinase. Part of the activity could be removed from a culture fluid of human type tubercle bacillus by use of a protein precipitant, and recovered from a solution of the washed protein. Methylene blue did not serve as a hydrogen acceptor for the oxidation of catechol catalysed by this enzyme.

CASON, J., & ANDERSON, R. J. (1938). **The Chemistry of the Lipids of Tubercle Bacilli. LVI. The Wax of the Bovine Tubercle Bacillus.**—*J. biol. Chem.* **126.** 527-541. 4 tables. [19 refs.] [Authors' summary copied *verbatim*].

The results of our investigation of the purified chloroform-soluble wax from the bovine type of the tubercle bacillus may be summarized as follows :

1. The composition of the wax is in general similar to the wax contained in the alcohol-ether extract of the human tubercle bacillus and which is obtained from the mother liquors in the purification of the phosphatide fraction.

2. The following types of compounds were obtained on saponification of the wax : (*a*) water-soluble constituents, glycerol and carbohydrate, (*b*) the ether-alcohol-insoluble Wax Acids I and II, (*c*) ether-alcohol-soluble fatty acids, and (*d*) neutral or unsaponifiable matter.

3. The carbohydrate is a complex mixture of organic phosphoric acids and a phosphorus-containing neutral polysaccharide. The neutral polysaccharide on hydrolysis yields (*a*) organic phosphoric acids, among which inosite monophosphoric acid is apparently present, (*b*) mannose, (*c*) inosite, and (*d*) an unidentified reducing sugar.

4. The ether-alcohol-soluble Wax Acid I represents a mixture of optically active acids with an average molecular weight of about 1,200, containing hydroxyl and methoxyl groups. The chief component is bovine mycolic acid which is very similar in its properties to mycolic acid obtained from the wax of the human tubercle bacillus. Bovine mycolic acid, when heated under reduced pressure to 250-300°, cracks and n-hexacosanoic acid distils off.

Wax Acid II represents a mixture of optically active acids having an average molecular weight of about 630 and containing hydroxyl and methoxyl groups.

5. The ether-alcohol-soluble fatty acids consisted of (1) solid saturated fatty acids which on fractionation yielded (*a*) palmitic acid and (*b*) a tetracosanoic acid of unknown constitution ; (2) a small quantity of unsaturated fatty acids of high molecular weight but of unknown composition ; (3) a new saturated optically inactive branched chain acid, $C_{18}H_{36}O_2$, isomeric with stearic acid ; (4) a mixture of levorotatory acids having an average molecular weight of about 430 which could not be separated or identified.

6. The only ordinary fatty acid found among the ether-soluble constituents of the bovine tubercle bacillus wax was palmitic acid.

7. The neutral or unsaponifiable matter contained a crystalline dihydroxy monomethoxy alcohol, $C_{35}H_{72}O_3$, identical with phthiocerol, which has previously been found only in the waxes from the human tubercle bacillus. About one-half of the neutral material was a non-crystalline substance of unknown composition,

HENNINGER, E. (1937). Beobachtungen und Untersuchungen über Tularämie. [**Observations on Tularaemia**].—*Zbl. Bakt.* I. (Orig.). **140.** 105-109.

Experience shows that tularaemia in wild animals is often not noticed until the disease is diagnosed in man. Five cases of human tularaemia which occurred in Germany are described. One case was a laboratory infection involving H. himself, one a gamekeeper who became affected in the course of his duties, two cases were found by routine serological tests, and the fifth case was a person who had evidently contracted infection in the country whilst gathering berries.

For diagnosis a rapid agglutination test is of value and by its use evidence of infection can often be obtained in apparently healthy domestic animals and deer. It is suggested that blood sucking insects play a part in transmission of the infection. —V. CHLÁDEK (PRAGUE).

DAVID, H. (1937). Zur Diagnose der Tularämie des Menschen und der Tiere. [**Diagnosis of Tularaemia in Man and Animals**].—*Zbl. Bakt. I.* (Orig.). **140.** 109-114. 2 figs., 1 table.

The fact that infected hares can be easily captured accounts for numerous infections in man. Affected hares may be in good condition and the clinical signs or lesions found P.M. are not suggestive exclusively of tularaemia. During the advanced stage of infection the spleen is enlarged, but it is not always easy to diagnose the disease directly in the hares. The simplest way to detect infection in hares is to inoculate g. pigs, which if infected, will die in 8-14 days and show characteristic lesions. The cultivation of *Pasteurella tularensis* from the blood and organs is uncertain, and antibodies are not regularly present in the blood. Mice are not suitable test animals. The g. pig inoculation test may sometimes fail, so direct cultivation is also advisable, on media with coagulated egg yolk, or on glucose-blood-cystein agar.

The agglutination test may be positive in cases of tularaemia in man eight days after infection, but some patients develop no agglutinins. D. states that brucellosis gives cross-agglutination of a non-specific character at low titres, but if it can be excluded, a titre of 1:20 for *P. tularensis* can be counted positive. Intradermal tests have been reported as satisfactory but the reactions are often very severe. Care must be taken to avoid infections while performing autopsies; rubber gloves should be worn and the mouth and eyes should be covered by a mask. Fly control is very important in laboratories.—V. CHLÁDEK (PRAGUE).

KUROSAWA, R., TATEZAWA, E., HIRATO, K., & KASAI, K. (1937). **Experimental Studies on Infectious Abortion in Mares. V. Cytological Observations of the Lochia.**—*J. Jap. Soc. vet. Sci.* **16.** 271-296 of pt. 1. 20 figs. on 5 plates, 5 tables. [9 refs.] [In Japanese; abst. from English summary pp. 32-35 of pt. 2].

Observations were made on the lochia in 13 cases of abortion in mares after experimental infection with *Salmonella abortus-equi*, in two natural cases of abortion associated with *S. abortus-equi* and a haemolytic streptococcus respectively and in 11 cases of normal parturition in mares.

Red blood corpuscles were abundant only in the red lochia after abortion, neutrophile leucocytes were abundant throughout the puerperium, eosinophiles were present in nearly all cases, large mononuclears were commonly seen in smears of yellow lochia, and lymphocytes were constantly present, being more numerous in the later part of the puerperium. Epithelial cells from the uterus were also abundant at the same period.

Lochia from cases of abortion was also rich in the causal organisms, which were often phagocytosed by the large mononuclear leucocytes.—J. E.

HIRATO, K., SOEKAWA, M., MIURA, S., & NAKANISHI, R. (1937). **Experimental Studies on Infectious Abortion in Mares. VI. Susceptibility of Geldings to Infection with** *Salmonella abortus-equi*.—*J. Jap. Soc. vet. Sci.* **16.** 445-464 of pt. 1. 7 tables. [5 refs.] [In Japanese: abst. from English summary pp. 59-62 of pt. 2].

From their experiments the authors conclude that it is highly probable that the virulence of *Salmonella abortus-equi* for healthy adult horses is very low and that the organisms do not multiply, but are rapidly eliminated from the tissues of inoculated animals without causing a true infection.

In geldings subjected to subcutaneous or intravenous inoculation the production of agglutinins began in four to five days and reached its maximum about ten days after inoculation. After intravenous inoculation O agglutinin was chiefly produced and H was produced in very small amounts or failed to appear, while after subcutaneous inoculation the production of H agglutinin was also marked and tended to approach that of O in amount.—J. G. MURRAY.

BAARS, G., & GLIESCH, R. (1939). Ergebnisse zehnjähriger Paratyphus-Enteritis-Untersuchungen in der Provinz Pommern. [**Results of Ten Years' Research on Paratyphoid Enteritis in Animals in Pomerania**].—*Tierärztl. Rdsch.* **45.** 267-271 and 289-294. 2 tables, 1 map. [Numerous refs.]

The authors state that during the ten years 1928-37 pathogenic bacteria were found in 1,222 of the 64,725 carcasses of various animals which were examined bacteriologically by the Meat Inspection Service in Pomerania. Of the organisms isolated, 88·8% belonged to the *S. enteritidis* group and 8·7% to the *S. typhimurium* group. The former were most frequent in the carcasses of calves and adult bovines (6·2% and 1·1% respectively), but since 1932 a marked tendency was observed towards a reduction in these figures, which is attributed to the successful control of paratyphoid enteritis in cattle in the province. However, the fact that pathogenic bacteria were found is considered by the authors to indicate the advisability of subjecting the carcasses of all animals slaughtered for meat to compulsory bacteriological examination. It is further stated that the examination of 200 herds of cattle showed that *S. enteritidis* may be excreted in the faeces of animals which have given a negative reaction to the agglutination test; such animals should be segregated as early as possible, since they may act as distributors of the disease.

HIPPMANN, W. (1938). Ein Fall vom Vorkommen des Bakt. suipestifer beim Rinde. [*Salmonella cholerae-suis* **Infection in an Ox**].—*Z. Fleisch- u. Milchhyg.* **49.** 45-46. [6 refs.]

An ox with a slight swelling in the left stifle joint, and which was lame and had a rectal temperature of 102°F., was slaughtered. The bacteriological examination of the liver, spleen, kidney and a hepatic lymph node revealed the presence of *S. cholerae-suis*. All animals on the same premises were examined bacteriologically, but the results were negative.—A. W. MÖLLER.

SCRIVNER, L. H. (1939). **Brucella Abortus and Its Agglutinin in the Colostrum and Milk of Cows.**—*Thesis, Ithaca.* pp. 85. 20 tables. [Numerous refs.]

An account of investigations to determine (1) whether breaks in four previously *abortus*-free herds were due to residual infection of the udder in the absence of a blood titre, and (2) the extent to which the infection is established in the udders of vaccinated and unvaccinated cows. The latter investigations were confined to

an experimental herd of 28 vaccinated animals and 21 unvaccinated. The vaccinates were injected as calves with strain No. 19. The four previously negative herds contained a total of 179 animals.

Blood and milk agglutination tests, together with milk cultures and g. pig inoculations were used to determine the presence or absence of *Brucella abortus*.

S. was unable to demonstrate *Br.a.* in the milk of any animals in any of the four previously negative herds except when accompanied by a blood titre of diagnostic level.

In the vaccinated herd, S. concludes that vaccination probably prevented the udder from becoming permanently infected, although 5 of 28 vaccinated cows eliminated *Br.a.* in the colostrum at the time of first calving. Vaccination decreased the amount of *Br.a.* agglutinins produced and stored in the bovine udder previous to and at the time of parturition. Agglutinogenic factors became firmly established in the udders of 12 of 22 unvaccinated cows exposed to severe natural infection. Five of 28 vaccinated cows and 10 of 24 unvaccinated cows eliminated *Br.a.* in the colostrum at the time of first parturition, when the cows were continually exposed during gestation to virulent natural infection. Two of 28 vaccinated cows eliminated *Br.a.* in the colostrum or milk at calving time while the blood titre remained on a sub-diagnostic level. Strain 19 was not recovered from the colostrum or milk of any vaccinated cow.—HERBERT L. GILMAN.

GAMBERINI, P. (1938). La brucellosi in Romagna con particolare riguardo al comune di Ravenna. [**Animal Brucellosis in the Ravenna District, Romagna**].—*Nuova Vet.* **16.** 263-268 and 293-295. 2 figs. [3 refs.]

G. urges more specific legislation against brucellosis, and suggests that provision be made for the compensation of owners. He gives the results of his examination of the blood of infected cattle (93 examined : 26 positive to Mirri's brucellin) and of sheep (1,181 examined : 583 positive to brucellin). He also examined the marrow of femurs of pigs (one positive for brucella out of eight examined), calves (12 positive out of 46) and a mule (positive), and samples of " ricotta " (a whey preparation), cheese and milk (all negative).—S. F. J. HODGMAN.

TOPACIO, T., & ACEVEDO, R. A. (1938). **Infectious Abortion in Imported Dairy Cows.**—*Philipp. J. anim. Indust.* **5.** 479-488. 3 tables, 1 appendix. [7 refs.]

TOPACIO has recorded [*V. B.* **8.** 347.] *Brucella suis* in outbreaks of the disease in swine outside the city of Manila. The disease appeared to have been introduced through imported breeding stock. In the present outbreak abortions had been reported in two dairy herds of imported cows, and on investigation the disease was proved to be due to *Br. abortus*.—J. A. GRIFFITHS.

FITCH, C. P., & BISHOP, Lucille M. (1938). **The Wild Rat as a Host of** *Brucella abortus*.—*Cornell Vet.* **28.** 304-306. [3 refs.]

The authors isolated *Brucella abortus* from the spleen of one rat out of 66 examined ; the rats were caught in a byre in which infected cattle were housed. They believe that rats feeding on infected foetal membranes may become infected, and refer to KARKADINOVSKY [*V. B.* **7.** 61.] and to BOSWORTH [*V. B.* **9.** 9.] who recorded *Br. abortus* infection in rats. Extermination of rats on *Br. abortus* infected farms is recommended as a control measure.—J. A. GRIFFITHS.

TIMONEY, J. F. (1938). **" Observations on a Contagious Bovine Abortion Vaccine Experiment ". Discussion on Mr. W. R. Kerr's Paper** [*Vet. Rec.* **50.** 717. (1938)].—*Vet. Rec.* **50.** 1235-1245.

T. states that the immunity conferred by live vaccines is relative and breaks

down if the animals are exposed to heavy natural infection. It is possible that the vaccine enables the calf to be carried longer, but even so, in cows so treated abortion often occurs in later months of pregnancy. On the other hand natural infection confers a high degree of resistance, possibly due to premunition. In his opinion the absence of agglutinins from the blood does not indicate absence of the disease. A positive reaction to the agglutination test at a dilution of 1:8 indicates past exposure to the disease, and it is questionable if non-specific agglutinins exist. The vaccine used by KERR is discussed [*V. B.* **9.** 373.] and a number of suggestions with regard to vaccination and to the agglutination test are made.

—P. S. WATTS.

HAMANN, E. E., & HUDDLESON, I. F. (1939). **Studies of an Atypical Strain of Brucella Abortus Isolated from a Naturally Infected Animal.**—*Vet. Med.* **34.** 232-233. 4 tables. [1 ref.]

Unsuccessful attempts had been made for 30 months to eradicate infection from a herd of cattle, 11 herd agglutination tests having been done. During the last 12 months of the period two double vaccinations with an intermediate R strain had been given. An atypical strain was isolated from a cow after the above vaccination.

It was apparently a normal S strain, which in g. pigs gave rise to only a very low agglutination titre; a few animals showed macroscopic lesions in the liver and spleen, but none of these lesions was extensive. The authors conclude that infection with this strain had existed in the herd, causing detection to be difficult.

—C. V. WATKINS.

PAGNINI, U. (1937). Ricerche e considerazioni sulla "panna montata" in vendita nelle latterie di Torino, con particolare riguardo alla presenza in essa di germi del genere *Brucella* e del microbacterio tubercolare. [**Presence of Tubercle Bacilli and Brucella in Whipped Cream Sold in Turin**].—*Ann. Igiene (sper.).* **47.** 213-226. [Numerous refs.]

The incidence of undulant fever in the province of Turin led P. to study its source, and whipped cream was incriminated. Out of 38 samples examined by g. pig inoculation, 23 were shown to contain *Br.a.* *Br.m.* was found in 2, and TB. in 14.

MARSH, H., & TUNNICLIFF, E. A. (1938). **Dysentery of New-Born Lambs.** - *Bull. Mont. agric. Exp. Sta.* No. 361. pp. 42. 12 tables. [Numerous refs.]

Most cases occur between 20-36 hours after birth; very few occur after 48 hours. Hyperaemia or severe congestion of the alimentary canal and enlargement of the mesenteric lymph nodes were the only gross lesions found. The outbreaks all occurred in lambing sheds, usually when cold wet weather prevailed, although, experimentally, cold sanitary conditions alone did not give rise to outbreaks, unless faeces from affected animals were spread on the ground.

Experimental results indicated that the disease was not due to a specific pathogenic organism, but to environmental conditions which favoured the development of normal but potentially pathogenic intestinal bacteria. The bacteria involved were found to be species of *Escherichia coli* [the authors' nomenclature is used throughout this abstract] and sometimes *Clostridium welchii* (Type 2 Simonds), which were also present in normal lambs. The feeding of 5·25 c.c. of intestinal contents from dysentery cases caused death in more than 50% of cases. Control feeding of contents from normal lambs in three cases caused death. *Cl.w.* was present in most normal and infected lambs. Of 131 strains from dysentery cases

only one produced a strong toxin. This strain appears to be identical with *Cl. ovitoxicum* [*Cl.w.* Type D]. *Cl.w.* Type B, as found in England, is certainly not involved. The immunization of ewes with formolized whole culture of both B and D types did not lower the incidence of dysentery in lambs in field cases.

Large numbers of strains of "*E. coli*" from the intestine (and body tissues when present) of normal and infected lambs were isolated and identified. Of these, "*Escherichia communior*" appears the most important. The feeding of 50 c.c. of the latter or of "*E. pseudoceloides*" caused death in about 33% of cases. Smaller doses did not produce infection and such large doses could not occur in natural infections. Strains from normal lambs produced nearly as high a mortality. The maximum virulence of the *coli* culture was not developed until after 40 hours' incubation.

Immunization of lambs with antiserum to the *Escherichia* showed a slight protective action in field and experimental cases, but did not control the disease in natural outbreaks. The early administration of internal antiseptics such as phenol sulphonate or acriflavine reduced the deaths to some extent.—S. F. Barnett.

Deskowitz, M. W. (1937). **Bacterial Variation as Studied in Certain Unstable Variants.**—*J. Bact.* **33.** 349-367. 4 figs., 6 tables. [Numerous refs.]

Fifteen unstable colonial variants of *Salmonella typhi-murium* were obtained by allowing a broth culture to age at 37°C. for several weeks and plating out on agar. The percentage of R and S colonies on plates streaked with R colonies during successive daily subculture remained constant and predictable within certain limits. Four tables show the effect of ageing, incubation at lowered temperature, various chemicals, pH and subculture in broth, on the ability of unstable colonies to yield stable and unstable colonies. The mechanism of unstable variation and its relationship to ordinary dissociation is discussed, and the conclusion is reached that bacterial variation, like recurrent gene mutation in higher forms, is due to an inherent property of bacterial protoplasm, independent of environment, and that ordinary dissociation possibly differs only quantitatively from unstable variation.
—R. O. Muir.

Sterne, M. (1938). **Variation in the Colony Form of the Anthrax Bacillus.**—*Onderstepoort J. vet. Sci.* **10.** 245-250. 2 tables. [11 refs.]

A study was made of uncapsulated avirulent variants from two virulent strains of *B. anthracis*. It was found that these variants possessed a complex dissociation pattern and that there was a tendency for sporogenous types to produce asporogenous variants. Two highly unstable phantom variants were obtained which continuously gave rise to rough non-phantom daughter strains, which in their turn showed further dissociation. All the variations encountered appeared to be of the continuous type and this study bears out the suggestion by Deskowitz [see preceding abstract] that the difference between unstable variation and ordinary variation is only quantitative.

Bovin, A., & Mesrobeanu, Lydia. (1938). Les antigènes somatiques et flagellaires des bactéries. [**Somatic and Flagellar Antigens of Bacteria**].—*Rapp. Ier Congr. int. Ass. Microbiol. Langue franç., 1938.* pp. 5-57. 1 table. [Numerous refs.] [Also appeared in *Ann. Inst. Pasteur.* **61.** 426-478].

A review article which does not lend itself to abstraction. It deals chiefly with the antigenic structure of pneumococci, streptococci and salmonella organisms, and briefly with the nature of exotoxins. The chemical and biological properties of "antigène-complet" and its relation to O antigen are discussed. Vi antigen

probably has a chemical constitution which is similar to that of O antigen. The properties of the H antigen in salmonella and clostridial organisms are discussed. Anyone interested in this subject, particularly from the chemical aspect, should consult the original article.—John Francis.

Brown, H. C. (1938). **Some Observations on the Electric Charge of Micro-Organisms.**—*Sci. J. R. Coll. Sci.* **8.** 52-57. 3 figs.

A cell for the study of microcataphoresis and a method of estimating the electric charge on particles is described. When haemolytic immune body is injected into an animal it destroys the red corpuscles, this destruction being preceded by a lowering of the negative charge of the red cells. Intravenous administration of potassium ferrocyanide by increasing the negative charge of the corpuscles protects mice from the effect of haemolytic immune body. Immune serum reduces the negative charge on bacteria and white corpuscles, thus aiding phagocytosis. Potassium ferrocyanide prevents this.

The charge on the developmental and cultural forms of *T. melophagium*, *T. lewisi* and *T. cruzi* was found to be negative, though the charge of the blood forms varied. When a relapse occurs in mice after spontaneous recovery a reversal of the sign of the charge invariably occurs. Passage from animal to animal in the same species does not change the character of the charge, but passage to a more resistant animal does do so. Positively charged variants of *T. evansi* are more susceptible to the action of tryparsamide than the negatively charged variants. —J. Francis.

DISEASES CAUSED BY PROTOZOAN PARASITES

Mazza, S., & Guerrini, F. Z. (1936). Comprobación de un nuevo caso de forma aguda benigna de enfermedad de Chagas y de un cachorro portador de *S. cruzi* en Añatuya, Santiago del Estero. [**A Case of Chagas' Disease**]. —*9th Reun. Soc. argent. Pat. reg. N.* **1.** 517-521. 1 fig.

Trypanosoma cruzi was demonstrated in blood taken from a three-month-old puppy living in a house in which human cases occurred.

Mazza, S. (1936). Efectos de la transmisión experimental de *Trypanosoma equinum* (Voges) en armadillos y zorros. [**Transmission of *Tryp. equinum* to Armadillos and Foxes**].—*8th Reun. Soc. argent. Pat. reg. N.* **2.** 1007-1009. 1 fig. [2 refs.]

M. states that armadillos and foxes are susceptible to *Tryp. equinum* infection. A healthy armadillo of the Dasypodida family, injected with *Tryp. equinum*, died after six days, and trypanosomes were demonstrated in the blood. Of two artificially infected foxes, one died 38 days after infection, and trypanosomes were present in the blood. The second died 120 days after infection, trypanosomes being demonstrable in its blood only from the 12th to the 60th days and none P.M. Blood taken from the living animal 68 days after infection, however, proved virulent.

I. Stabler, R. M. (1938). *Trichomonas gallinae* (**Rivolta, 1878**) **The Correct Name for the Flagellate in the Mouth, Crop and Liver of the Pigeon.**—*J. Parasit.* **24.** 553-554.

II. Florent, A. (1938). La trichomoniase du pigeon. [**Pigeon Trichomoniasis**].—*Ann. Méd. vét.* **83.** 401-428. 6 figs. on 2 plates. [11 refs.]

III. Cailleau, R. (1939). L'acide ascorbique, facteur de croissance pour le flagellé *Trichomonas columbae*. [**Ascorbic Acid as Growth Factor for** *T.c.*].—*C. R. Soc. Biol. Paris.* **130.** 319-321. [6 refs.]

I. A review of the literature on the *Trichomonas* from the upper digestive tract and liver of the pigeon reveals much confusion regarding its correct name. Since only one flagellate has actually been described from these sites, the names, *Cercomonas gallinae*, *C. hepaticum*, and *T. columbae* of various authors thus become synonyms of *Trichomonas gallinae*.

II. Infection of the pigeon by *T. columbae* [*T. gallinae* according to Stabler in I] is by direct ingestion or indirectly by contamination of the drinking water. Chickens are resistant. Young pigeons are first attacked in the course of an outbreak, but later older birds may succumb. Longevity of the flagellates in culture varies with the media and nature of contaminating bacteria. The virulence varies enormously and many pigeons may be carriers of saprophytic strains.

Lesions occur in the beak, oesophagus, intestine, liver, pancreas and lungs; diagnosis is based on the detection of the parasites in the depths of the necrotic ulcers in the mouth, or in the faeces. They can be isolated from the blood, spleen, and bone-marrow after death. A detailed description of the macroscopic and microscopic pathology is given, and the symptomatology is described. Differential diagnosis is discussed. Treatment is symptomatic or sometimes surgical. Disinfection of the water supply is important in control.

III. *T.c.* [see note in II] would not multiply beyond the first passage in broth to which pigeon serum free of ascorbic acid was added, but reached 7 passages after the addition of ascorbic acid.

It could be grown in broth plus calf liver which had been kept for 14 months, provided that ascorbic acid and cholesterol were added to the medium.—M. L. B.

Hinshaw, W. R., McNeil, E., & Kofoid, C. A. (1938). **The Relationship of** *Hexamita sp.* **to an Enteritis of Turkey Poults.**—*Cornell Vet.* **28.** 281-293. 2 tables. [11 refs.]

Enteritis in turkey poults in California, sometimes designated "trichomoniasis", is due, in the opinion of the authors, to the flagellate *Hexamita* (= *Hexamitus* = *Octomitus*), which is recorded by others from tortoises, frogs, pigeons and trout with enteritis. Field studies included 1-10 visits to over 40 ranches, autopsies, and experimental work on turkey poults. There was striking similarity between the results of the field studies and the experimental results. Experiments with *Hexamita* alone and with almost every combination of *Hexamita* and the other protozoa present (*Chilomastix*, *Trichomonas*, and *Amoeba*) proved that *Hexamita* alone was a possible cause of the enteritis, although bacteria and viruses were not excluded. *Trichomonas* was often the most abundant of these organisms. Coccidia were not sufficiently numerous or frequent enough to have caused the disease. In the duodenum and jejunum *Hexamita* only was found. In the caecum one species of *Hexamita*, two species of *Trichomonas* and *Amoeba* and one species of *Chilomastix* were found. *Hexamita* was also consistently found in the bursa fabricii, and might be present there even in birds only eight months old or in birds as old as two years. An interesting comparison is made between the bionomics and pathogenic effects of *Hexamita* and *Giardia*.

The disease may cause 20-90% mortality, especially in young poults 1-9 weeks old, among which mortality is highest in those aged 3-5 weeks, while older birds suffer less. The annual loss from the disease in California alone may be $100,000. The symptoms are listlessness, droopy wings, seeking for more warmth, stilted gait, with droppings foamy or watery, or both, and there is rapid emaciation, although

the birds feed normally. Survivors remain stunted and under weight, and most birds exposed to infection remain carriers. Autopsy revealed catarrhal enteritis chiefly of the duodenum and jejunum, with watery contents and bulbous distensions. The caeca showed nothing more than congestion around the ileo-caecal opening. Oedema of the tissues, ascites and " foaminess over the mesentery " may be present.—G. LAPAGE.

HART, L. (1938). **Eimeria Tenella Infection in Chickens Eight Days Old.**—*Aust. vet. J.* **14.** 74.

Previous reported outbreaks of coccidiosis in domestic fowls in New South Wales have been due to *Eimeria tenella*. The greatest losses have generally been among chickens from 3-10 weeks old. H. reports an outbreak in which there were heavy losses among chickens aged 4-8 days. A footnote adds that *E. necatrix* infection had been recently seen by the author in adult fowls in New South Wales.
—T. S. GREGORY.

BLOOM, W., & TALIAFERRO, W. H. (1938). **Regeneration of the Malarial Spleen in the Canary after Infarction and after Burning.**—*J. infect. Dis.* **63.** 54-69. 14 figs. on 5 plates. [18 refs.] [Abst. from authors' summary].

Infarcts of varying sizes occur sporadically in the spleens of canaries heavily infected with *P. cathemerium*. They are essentially haemorrhagic in character and are associated with propagating thrombi in the splenic veins which generally extend from the capsule towards the hilum. They probably result from the malarial infection, as all attempts to associate them with bacteria, viruses or intravenous injections of India ink have failed.

Practically all such infarcts become completely regenerated, as ascertained by laparotomy and by microscopic examination of tissues. The histological repair process is described in detail.

The same type of complete splenic regeneration follows experimental burning of a tip of the spleen except that the speed of regeneration is slower, due probably to the loss of the capsule, and there is a greater exudation of heterophiles during early inflammation and of eosinophiles during late inflammation and repair.

STAUBER, L. A. (1939). **Factors Influencing the Asexual Periodicity of Avian Malarias.**—*J. Parasit.* **25.** 95-116. 7 figs., 1 table. [Numerous refs.] [Author's summary copied *verbatim*].

1. A study of the experimental modification of the asexual periodicity of avian malaria was conducted on three strains of *P. cathemerium* (" C ", " D " and " N ") and on one strain of *P. relictum* var. *matutinum* (" R "). One of the strains (" N ") was obtained by single-parasite isolation.

2. The synchronous periodicity of reproduction of avian malaria is affected by alternate 12-hour periods of high and low temperature.

3. It is affected by light itself—active through the eyes and not through the body surface—if of sufficient intensity to cause the host to be active.

4. As a corollary to (2), it is associated with rest or sleep which seem to be important orienting factors.

5. It is not affected by host feeding of the type devised in these experiments.

6. It is considered possible that the host may furnish a set of critical temperature conditions which orients the time of segmentation. In such an hypothesis, the period of rest becomes important in that it makes possible the temperature differential necessary for the appearance of the critical value.

CAVALLETTI, S. (1938). Sulla piroplasmosi dei suini. **[Piroplasmosis in Pigs].** —*Nuova Vet.* **16.** 114-115. 1 fig.

C. gives an account of an outbreak of porcine piroplasmosis in Perugia in 1936. He noted the presence of *Rhipicephalus sanguineus* on the animals; he describes the symptoms and the appearance of the piroplasms. Curative treatment with Bayer acaprin gave good results. White pigs were more liable to attack than the local black breed.—S. J. HODGMAN.

SHIRLAW, J. F. (1938). **On the Relationship between "Lahore Canine Fever" and "Tick Fever" of Dogs due to *P. gibsoni* Infection, with Observations on their Pathology and Haemocytology.**—*Indian J. vet. Sci.* **8.** 293-316. 6 figs. on 4 plates, 7 charts. [6 refs.]

Attention is drawn to the high mortality occurring in imported and other well-bred dogs in the Punjab from "Lahore canine fever", and it is suggested that the disease occurs throughout India, and may also occur in Burma, Ceylon and Assam. Probably few imported dogs escape infection, and the mortality in their offspring is extremely high, while native animals have little susceptibility and probably act as reservoirs of infection. The disease is most prevalent in the season of tick activity, and it was thought it might be a piroplasmosis, but early attempts to transmit it by blood inoculation were a failure. This is explained by the later experience that *Babesia gibsoni* is not regularly transmissible by blood inoculation, and that many of the pariah dogs used in experiments are not susceptible. The findings of previous workers that salmonella might have an aetiological connexion with the disease are considered unconvincing.

The disease sets in suddenly with high fever, evidence of acute abdominal pain and the occasional vomiting of bile-stained fluid. A thin serous discharge from the nose may be present, and when accompanied by high fever and increased difficulty of respiration may lead to a suspicion of pneumonia. Little remission of temperature occurs till the fifth or seventh day, when it may drop temporarily to nearly normal. This remission of temperature may be accompanied by a transient diarrhoea and an inflammation of the gums. The temporary remission of fever is followed by an abrupt rise to about 106°F. and then fluctuates between 103-105°F. for several days. If the dog survives this period there is a second partial remission of fever with occasional paroxysmal rises. This stage is characterized by increasing anaemia and cardiac involvement, but the animal may appear brighter. The prognosis is invariably bad and, without warning, the temperature may again rise to 104-106°F., to be followed by pneumonia or a sudden fatal haemorrhage from the nose or intestines.

At the onset of the disease there is a marked leucocytosis, but the erythrocytes are normal in size and the haemoglobin content of the blood is normal. Later, large mononucleated histiocytes make their appearance. After about two weeks the haemoglobin percentage declines, and the red blood cell count may fall eventually to two million per c.mm.

In some cases with this syndrome *B. gibsoni* makes a rare appearance in the blood, where it can only be detected on alleviation of the fever.

At autopsy the spleen is found to be enlarged up to ten times its normal size, and is dark red or even chocolate in colour; the liver is also grossly enlarged, cirrhotic, studded with petechiae and frequently bile-stained. Systemic lymph nodes are swollen and haemorrhagic, and the gastro-intestinal mucous membrane shows petechiae and sometimes areas of ulceration.

A description is given of the histopathology of the spleen, liver and bone-marrow, the most important observation being the detection of granules appearing

in well defined clusters in the cytoplasm of polyblasts and reticular cells of the spleen and bone-marrow. These granules stain intensely with Heidenhain's iron haematoxylin but indeterminately by Romanowsky stains. Attempts were made to set up *B. gibsoni* infection in pariah dog puppies by the inoculation of citrated blood or saline suspension of spleen and bone-marrow. It is stated that all of 16 puppies were infected in time and charts are given of the reaction in seven cases. The febrile reaction resembled that described for " Lahore canine fever " but was not always so severe. P.M. the enlargement of the spleen and liver was found, even in cases in which the fever reaction had not been severe. The granules of the reticular cells of the spleen and liver were also detected in all cases. *B. gibsoni* appeared in the blood of animals infected by inoculation, but was usually only detectable for a few days, and its appearance in the blood was often delayed for one or two months after inoculation.—U. F. Richardson.

van Volkenberg, H. L. (1939). **Observations of Anaplasmosis as It Occurs in Puerto Rico.**—*Vet. Med.* **34.** 234-236.

Anaplasma marginale has been found by the author to be the cause of the anaplasmosis which occurs in Puerto Rico, chiefly among cattle over 30 months old. *Babesia bigemina* and *Babesia argentina* are also said to cause disease in that country ; he did not observe *Anaplasma centrale*. The cattle ticks are *Boophilus annulatus* and *B. australis*. The tropical horse tick *Dermacentor nitens* and the brown dog tick *Rhipicephalus sanguineus* also occur. Only one tabanid *Chrysops variegata* is common ; other species are rare. The native cattle are very resistant to the tick-borne diseases ; dairy cattle of improved breeds raised on the island also develop a resistance to tick fever, except with regard to anaplasmosis. Dairy cattle imported from the United States are very susceptible to anaplasmosis and relapses occur frequently.—J. A. Griffiths.

I. Schwetz, J. (1934). Sur la présence de certaines inclusions globulaires dans le sang des cobayes et leur ressemblance avec certaines formes de *Bartonella muris ratti*. [**The Occurrence of Inclusion Bodies in the Blood of Guinea Pigs, and Their Resemblance to Bartonella**].—*Bull. Soc. Path. exot.* **27.** 515-522. 2 figs. [6 refs.]

II. Weinman, D., & Pinkerton, H. (1938). **A Bartonella of the Guinea-Pig, *Bartonella tyzzeri* sp. nov.**—*Ann. trop. Med. Parasit.* **32.** 215-224. 3 figs. on 1 plate. [Numerous refs.]

I. S. reviews the literature on the transmissibility of the bartonella of rodents to pigs, and points out that Klein *et al.* [(1930). *Arch. Schiffs. u. Tropenhyg.* **34.** 274.], who reported successful transmission and also the existence of a latent infection of g. pigs detectable by splenectomy, were only able to detect rare rod forms, the majority of the erythrocyte inclusions being coccoid. Work on this problem in the Congo showed that coccoid inclusions, and occasional rod forms, could be detected in almost all g. pigs, though splenectomy or infection with trypanosomes might make them more numerous. Wenyon and Low (1914.) confirmed that similar inclusions could be detected in the blood of g. pigs born and bred in England, and that these bodies are indistinguishable from the so-called *Paraplasma flavigenum* of Seidelin which, it was claimed, appeared in the blood of g. pigs inoculated from cases of yellow fever. It is concluded that these inclusions are not proved to be *Bartonella*, and it is suggested that they may be nuclear remnants.

II. The authors record the detection of a true bartonellosis of g. pigs in Peru, in the area where human infection with *B. bacilliformis* and canine infection with *B. canis* occurs. They discuss previous records of bartonella infection in g. pigs and accept the view of SCHWETZ [see I, p. 763.] that the inclusions described were probably nuclear remnants. G. pigs are not susceptible to inoculation with either the human or canine species of *Bartonella*, but are readily infected with the g. pig organism, which is therefore considered a distinct species, and named *B. tyzzeri*.

The organism occurs as single or composite rods, 1·5μ to 4μ in length, and sometimes as cocci. On staining with Giemsa, no differentiation between nucleus and cytoplasm is evident, the organisms staining an intense red-violet. Only about one erythrocyte per thousand was invaded, and no serious disease resulted from infection. The organism grew readily in Noguchi's semi-solid medium, the cultures resembling those of *B. bacilliformis*.—U. F. RICHARDSON.

WEINMAN, D. (1938). **On the Cause of the Anemia in the Bartonella Infection of Rats.**—*J. infect. Dis.* **63.** 1-9. 1 fig., 4 tables. [Numerous refs.] [Abst. from author's summary].

The parasite *Bartonella muris* appears to be the direct cause of erythrocytolysis and thus of haemoglobin liberation, since :- (a) it is present within or attached to red cells when lysis occurs ; (b) when no parasites are visible there is no demonstrable lysis ; (c) fragmented red cells are frequently encountered and the cell remnants contain parasites, and (d) the more fragile and achromic of the red cells are those containing parasites.

VAN DER WALLE, N. (1938). Recherches sur l'existence d'infections à leptospires chez les chiens à Anvers. **[Leptospira Infections of Dogs in Antwerp].**—*C. R. Soc. Biol. Paris.* **128.** 804-806. 1 table. [3 refs.]

The incidence of infection with *L. icterohaemorrhagiae* or with *L. canicola* was investigated in 100 dogs slaughtered at the town pound for various reasons. No spirochaetes could be found in the urine, and inoculation of kidney material into g. pigs also gave negative results. Cultures of *L. canicola* were obtained from kidney material. Their virulence was very low. Agglutination and lysis reactions of the serum of all the dogs showed that 50% of dogs between 3-6 years and 66% of all dogs of 7 years or more were infected with one spirochaete or with both, but that the infection was very slight. Males were more often infected than females.

KRESTAN, W. (1936). Spirochätennachweis aus Organen (durchgeführt mit Geflügelspirochäten und Leptospiren). **[Detection of Fowl Spirochaetes and Leptospira by Examination of Organs].**—*Wien. tierärztl. Mschr.* **23.** 569.

It is not always possible to demonstrate spirochaetes in the blood and organs of infected animals. The most suitable method in K's opinion, is histological examination using Levaditi's silver staining method. If the organs are pulped and emulsified at a concentration of 1:10 in physiological saline, the emulsion filtered through a coarse filter, and the filtrate centrifuged, leptospira in the sediment may be revealed by dark-ground illumination. This enrichment technique is only applicable to living leptospira, as dead organisms decompose during centrifugation.—V. CHLÁDEK (PRAGUE).

DISEASES CAUSED BY VIRUSES

STANLEY, W. M. (1938). **Virus Proteins—a New Group of Macromolecules.**—*J. phys. Chem.* **42.** 55-70. 1 fig., 4 graphs. [Copied *verbatim* from *Rev. appl. Mycol.* **17.** 407].

This is an interesting survey of recent advances in the study of virus proteins, with special reference to their inclusion in the field of colloid chemistry as a new group of macromolecules. Several virus proteins, some from plant and others from animal and bacterial diseases, some larger and some smaller than the relatively immense tobacco mosaic virus protein, have been isolated and are undergoing investigation in various laboratories. Since the virus proteins possess the reproductive capacity and other properties characteristic of living organisms, as well as molecular features, any attempt at the present juncture to relegate them to one or other of these groups would be premature pending further experimental data.

TRAUB, E. (1939). Ueber Immunität und aktive Immunisierung gegen Viruskrankheiten. [**Immunity and Active Immunization against Virus Diseases**]. —*Z. InfektKr. Haustiere.* **54.** 169-213. [Numerous refs.]

Although the neutralization of virus *in vitro* is well known, we are still ignorant of details of immunization against virus *in vivo*. It is unlikely that this neutralization acts only on the surface of the virus molecules. The complement-fixation test is rarely of value for the diagnosis of virus diseases, but its possible value should be studied in diseases which are difficult to diagnose, such as equine infectious anaemia. The precipitin and agglutination tests behave with elementary bodies—in the virus diseases in which they occur—in the same way as with bacteria. Leucocytes apparently play no important part in the development of immunity. The presence of active virus in the blood is evidently not essential to the development of immunity, since with certain exceptions immunization may be carried out with inactive virus. Virus carriers which are infective for a long time are rare.

The danger of active immunization is that the treated animals may spread infection. The method must therefore only be used when the circumstances really warrant the risk of this contingency. Simultaneous inoculation of virus and specific serum is the best method but does not prevent the spread of the disease. The cheapest and most effective method is to use virus, provided the inoculation does not result in numerous losses or a spread of the disease. Development of a suitable immunity depends in many cases on local reactions after inoculation. The immunity conferred by virus inactivated by chemical or physical means is not as a rule sufficiently effective by itself but this method, followed by administration of active virus, is a useful combination in heavily infected areas. Trials recently made with the virus of foot and mouth disease to combine adsorption of the virus with inactivation by formalin may lead to the discovery of a more effective method which might have general application.

Recently work has been carried out on the concentration and purification of virus. American workers have been successful in developing virus fractions of extraordinary virulence, by using the ultracentrifuge. The production of concentrated virus is very expensive however, and a further disadvantage is the lability of virus protein. Isolated virus, being in the stage of multiplication, is in many ways different from intracellular virus. [This valuable review should be read in its original form—Ed.]—V. CHLÁDEK (PRAGUE).

LÉPINE, P. (1939). Ultravirus et immunité. [**Ultraviruses and Immunity**].—*IV Congr. int. Pat. comp., 1939.* **1.** 19-44. [Numerous refs.] [In French : English, German, Italian and Spanish summaries]. [Abst. from author's summary].

Modern research has not yet solved the problem of acquired immunity (after infection or vaccination) in ultravirus diseases. The demonstration of viricidal action in the body fluids of recovered or vaccinated men or animals, and analogies with immunity in bacterial infections, have given rise to the humoral theory of immunity in ultravirus diseases. This theory does not explain all observed facts. Some virus infections produce little or no antibody, although they leave a strong immunity. If antiviral bodies are formed, they do not always show a parallelism with the course of immunity, which may persist for a considerable time after humoral antibodies have disappeared.

The cellular theory of immunity explains the resistance by a change in the specific sensitive cells, *i.e.* without any antibody function. This theory, however, does not explain everything. Probably immunity consists of a combination of these mechanisms, the change in cell responsivity being the *primum movens* in the change of defensive processes and the production of humoral antibodies contributing to the sterilization of the organism. In plants, immunity is obtained either by means of elimination of the diseased tissues or by means of a process of premunition (the defensive action of a weak virus against a strong one).

The study of immunity includes also the question of the persistence of the virus in the organism after recovery or after vaccination, and the question of the physical condition, whether living or dead, of a virus used as a vaccine. The heterogeneous nature of antigens and of body reactions may explain the different experimental results obtained.

Recent advances in physicochemical research on virus proteins may provide the solution of several immunity problems.

LÜHRS. (1938). Was kostet die Maul- und Klauenseuche ? [**Economic Loss Due to Foot and Mouth Disease**].—*Berl. tierärztl. Wschr.* May 13th. 277-279.

The loss of meat due to the recent outbreak of F. & M. disease in Oldenburg was estimated at about one and a half million marks, and that of milk at about 582,000 marks. In addition the losses amounted to 1·8 million marks in cattle, 117,000 in swine and 62,000 in sheep. The losses from this disease in Odenburg was estimated as follows :– 9·7 million marks in 1911, 4·2 millions in 1915, 7·9 millions in 1920 and 10·2 millions in 1926.—HANS GRAF (ZÜRICH).

ZINTEL, J. (1938). Kampanie przeciwpryszczycowe na Huculszczyznie. [**The Campaigns against Foot and Mouth Disease in the Huzul Country**].—*Przegl. wet.* **53.** 91-106. 3 figs., 1 table.

The mountainous south-east frontier of Poland required special measures against F. & M. disease in the years 1932-1937. It was necessary to appoint a special staff of veterinarians to inspect, with the aid of the police, all alpine pastures and the cattle kept thereon. Free veterinary service was given and there was supervision of frontier traffic. During the period dealt with, the ears of the cattle were marked for purposes of identification. Despite the very difficult circumstances, F. & M. disease was only imported on one occasion, and was quickly stamped out.—V. CHLÁDEK (PRAGUE).

Gräub, E. (1938). Die Maul- und Klauenseuche vom epidemiologischen Standpunkt aus betrachtet. [**Foot and Mouth Disease from the Epidemiological Viewpoint**].—*Schweiz. Arch. Tierheilk.* **80.** 524-530.

In emergency G. inoculates cattle with doses of 100 c.c. of blood taken from an adult bovine at the height of the infection and in which the virus has been killed by the addition of crystal violet. It is stated that this confers immunity against the disease in a freshly-infected herd and greatly reduces the severity in animals which have been artificially infected with saliva of infected animals.

G. is of the opinion that serum-virus inoculation is the best method of dealing with an outbreak of F. & M. disease.—A. W. Möller.

Cohrs, P., & Weber-Springe, W. (1939). Maul- und Klauenseuche beim Reh und Hirsch. [**Foot and Mouth Disease in Roe Deer and Red Deer**].—*Dtsch. tierärztl. Wschr.* **47.** 97-103. 7 figs. [8 refs.]

A doe was found dead in July, 1938 and there were ulcers in the mouth and on the coronets. Ulcers were also present on the mucosa of the rumen and there were several disseminated myocardial necrotic foci. Tests for the presence of the virus and of specific bacteria yielded negative results. In August a second case occurred in a shot roe deer in which there was ulceration of the coronets of both forelegs, probably complicated by secondary infection in the course of F. & M. disease. In October examination of both forelegs of a stag revealed an exungulation of the medial claws. Aphthae were found under the horn of the apparently sound claws.

The danger of the spread of F. & M. disease by deer in European conditions does not seem very great, although they may spread it mechanically without actually developing the disease. Sick and lame deer should be shot and carefully examined for F. & M. disease. [Diagnosis in these cases was based solely on the appearance of the lesions].—V. Chládek (Prague).

Haan, & Maas. (1939). Die aktive Immunisierung gegen Maul- und Klauenseuche mit Riemser MKS.-Vakzine nach Waldmann und Köbe. [**Active Immunization against Foot and Mouth Disease with Waldmann and Köbe's Riems Vaccine**].—*Berl. Münch. tierärztl. Wschr.* March 17th. 165-175. 3 tables, 2 graphs. [6 refs.]

A supplement to an earlier report [*V. B.* **9.** 84]. Up to November, 1938 a total of 89,702 cattle, 4,972 sheep and 2,687 goats had been vaccinated against O virus, some with bovine virus vaccine, some with culture virus vaccine and a few with a mixture of these two. Experience showed that these vaccines were innocuous to the animals and that immunity was effective within five days after injections in the case of bovine virus vaccine and somewhat later in the case of culture virus vaccine. Although cases of F. & M. disease occurred in vaccinated animals within 10 days, hardly any occurred after this interval and 95% of the animals proved to be immune against contact infection up to the maximum period of observation,—8-9 months. [For details of the vaccinations in the various districts, the original must be consulted as the results are given in part schematically].—J. E.

I. Olitsky, P. K., & Harford, C. G. (1938). **Intraperitoneal and Intracerebral Routes in Serum Protection Tests with the Virus of Equine Encephalomyelitis. I. A Comparison of the Two Routes in Protection Tests.** —*J. exp. Med.* **68.** 179-189. 6 tables. [Numerous refs.]

II. Records, E. (1938). **Infectious Equine Encephalomyelitis and its Biological Treatment.**—*Vet. Med.* **33.** 201-203. 1 fig. [12 refs.]

III. Lyon, B. M., & Wyckoff, R. W. G. (1938). **Chick Vaccine for Equine Encephalomyelitis.**—*Ibid.* 408-409. 3 charts.

IV. Beard, J. W., Finkelstein, H., Sealy, W. C., & Wyckoff, R. W. G. (1938). **Immunization against Equine Encephalomyelitis with Chick Embryo Vaccines.**—*Science.* **87.** 490. [7 refs.]

I. The method usually employed for the detection of humoral antibody in E.E. has been the intracerebral injection of serum-virus mixtures into mice. The present experiments show that the intraperitoneal route is more sensitive. It should be of value for its ability to detect antibody to a much higher degree and, owing to its sensitivity as a test, to indicate a negative result with a greater assurance that antibody is not present. Mixtures of immune serum and virus given intraperitoneally were found to give protection in dilutions which cause infection after intracerebral injection. The difference in protective power by the two routes is stated not to be due to the amount of inoculum or to the age of mice injected intracerebrally.

II. In treatment of infected equines, doses of 1,000 c.c. or more of anti-E.E. serum are recommended. As a prophylactic, periodic dosing with serum alone is not considered practicable. The use of formalinized horse brain tissue vaccine and of unmodified live virus have not proved satisfactory. A small dose of virus given simultaneously with 50-75 c.c. of anti-E.E. serum is said to have been used on 7,000 horses and mules with " very gratifying results " ; the immunity lasts about six months.

III. The prevention of this disease with a vaccine prepared by growing the virus on chick embryos has proved remarkably successful. Virus grown in this way and formalinized protected g. pigs and horses against 1,000 M.L.D. of virus given intracerebrally. Horses given 10 c.c. and 5 c.c. of the vaccine at intervals of ten days were resistant when tested a month later, whereas the controls and horses vaccinated with horse brain vaccine all became paralysed, and had to be destroyed. Chick vaccine produces a resistance so rapidly that it may be used during an epizootic with advantage. Over 250,000 horses in Canada and U.S.A. had been vaccinated up to September, 1938.

IV. The high virus content of chick embryo tissues infected with E.E. virus has been emphasized by the fact that it has proved possible to isolate from these tissues alone a homogeneous substance which seems to be the infective agent. The virus concentration in chick embryo tissues is 1,000-10,000 times greater than in the most infective horse brain examined, and the formalinized extracts of such tissues have proved correspondingly of higher immunizing value. The vaccine used has consisted of a 10% diseased tissue suspension containing 0·4% formalin. A 1% chick vaccine protected about 60% of the vaccinated animals ; more dilute vaccines proved worthless. Chick vaccine gave complete protection against 1,000 M.L.D. of virus.—J. A. Griffiths.

Sahai, L. (1938). **An Outbreak of Equine Encephalomyelitis in a Mounted Military Police Troop in Bihar. A Preliminary Report.**—*Indian J. vet. Sci.* **8.** 341-351. [3 refs.]

Reference is made to " kumri " which is endemic in Bihar and to equine encephalomyelitis as it occurs in America and Europe, and to the more recently reported occurrence of the latter disease in India. The outbreak now described occurred among 29 Australian horses in a small Indian station. 11 animals developed the disease, 10 within a period of five months and the last three months

later; 2 died and 7 were destroyed. Most of the cases were insidious in onset and chronic in their course. There was no fever, symptoms being mainly those of incoordination of action and paralysis of the hindquarters. They were clinically of the type of case that has been diagnosed as "kumri" in the past. Treatment was found of little or no use. Pathological changes consisted chiefly of congestion of the meningeal vessels and some gliosis.

Attempts to infect experimental animals with brain emulsions and cerebrospinal fluid were not successful. Estimations of the mineral content of fodder and blood-serum revealed nothing abnormal, and no poisonous substance was found in an analysis of the grasses of the district.—F. J. Andrews.

Holz. (1938). Thrombangiitis obliterans und Ependymitis granularis bei der ansteckenden Blutarmut des Pferdes. [**Thrombo-Angiitis Obliterans and Ependymitis Granularis in Equine Infectious Anaemia**].—*Berl. tierärztl. Wschr.* May 6th. 257-260. 4 figs.

Ependymitis granularis [*V. B.* **7.** 624.] was found in 61% of horses dead of infectious anaemia in Württemberg. Further histological examinations revealed the regular occurrence of thrombo-angiitis obliterans in the arteries of affected horses. The changes consist of nodular enlargements of the intima, leading to the complete occlusion of the smallest vessels. These histological findings explain certain of the clinical signs, observed in the course of E.I.A., such as disturbances of the circulation, oedema, and cardiac insufficiency. Two basic forms of thrombo-angiitis can be distinguished, the first taking the form of polypoid proliferation of the endothelial cells of the arterioles and the second resembling nodular atherosclerosis and occurring in the largest arteries.— V. Chládek (Prague).

Jacotot, H. (1938). La peste porcine chez le porc annamite. [**Swine Fever in Annamese Pigs**].—*Rec. Méd. vét. exot.* **11.** 153-158. 3 charts.

J. describes acute swine fever of young Annamese pigs up to 4 months old in Indo-China. After inoculation (sub-cut.) of 1 c.c. of a 1:500 dilution of defibrinated virulent blood the incubation period rarely exceeded 3 days. A temperature reaction quickly followed, being high until the 8th or 9th day, and then falling rapidly a few hours to one day before death. Individual resistance varied, death occurring from 4 days (rarely) to 20 days after inoculation. All signs and symptoms of the disease are accentuated. Infarcts of the kidneys and haemorrhagic "pseudo-vegetations" on the mucous membrane of the bladder generally occurred. A generalized skin eruption, best seen on the lower unpigmented parts of the body, was usual and there were exanthematous patches with dark necrotic centres. In more chronic cases a muco-purulent condition of the conjunctiva and even of the anterior chamber of the eye occurred. Contact infection produced very similar disease.

Experiments were made with a virus from Algeria and two local strains. Pigs were equally susceptible to the three strains of virus and avirulent organ emulsions of the Algerian strain gave protection against all three of them.—C. V. Watkins.

Zofijevsky, V. (1938). Ueber den Einfluss der Superinfektion mit Schweinepestvirus auf den Verlauf der Reaktion bei der Simultanimpfung gegen die Schweinepest. [**Effect of very Large Doses of Swine Fever Virus on Simultaneous Inoculation against Swine Fever**].—*Z. InfektKr. Haustiere.* **53.** 73-87. 4 tables. [5 refs.]

The usual dose of virus recommended is 2 c.c. Z. investigated the results of

a simultaneous serum-virus inoculation when greater doses of virus are administered. Each of 10 pigs received 60 c.c. of serum, and virus in doses from 2-20 c.c. The pigs given 16 and 20 c.c. of virus required additional doses of serum. 13 pigs were given serum in doses of 40-60 c.c. and virus in doses varying from 0·5-50 c.c. ; all recovered without treatment. Two control pigs were given 1 and 30 c.c. doses of virus respectively, but no serum. The first animal developed the disease but recovered, the second died of S.F. Z. concludes that the administration of fairly large doses of virus has no peculiar influence upon the simultaneous inoculation, provided that no very large amounts of virus are administered. Provided that the dosage with serum is sufficiently high, there is no danger if an odd animal gets a large dose of virus.—V. Chládek (Prague).

I. Röthel, R. (1937). Uebertragungsversuche bei experimenteller Virusstaupe. [**Transmission Tests with Dog Distemper**].—*Inaug. Diss., Hanover.* pp. 44. 2 charts. [Numerous refs.]

II. Dräger, K. (1938). Die Erfolgsmöglichkeiten bei der Behandlung der Hundestaupe auf der Grundlage spezifischer Immunisierung. [**Specific Immunization against Dog Distemper**].—*Vet.-med. Nachr. Bayer-Meister Lucius.* No. 6. pp. 117-128.

I. In inoculation experiments on 83 young dogs by intravenous, intramuscular and unstated routes, it was found that during the initial stages the blood of the affected animals always contained the virus, and that the blood serum was as virulent as the whole blood. Infection was transmitted in some cases by injecting urine of infected animals, or else eye material from affected dogs with keratitis.

In 13% of the test animals inoculation resulted in an attenuated form of the disease, without considerable temperature fluctuations, and after recovery these animals were immune. No difference in pathogenic effect was observed between two different strains of the virus which were used. It is claimed that the virus was transmitted from cat to dog and *vice versa*. No immunological relation could be established between dog distemper and swine fever virus.

II. A general discussion of the value and limitations of antiserum, vaccine and virus for the immunization of dogs against distemper. [Difficulties discussed are such as have been successfully overcome in the Laidlaw-Dunkin method of immunization].

Mitscherlich, E. (1938). Ueber Züchtungsversuche des Virus der Hundestaupe. [**Attempts to Cultivate the Virus of Dog Distemper**].—*Dtsch. tierärztl. Wschr.* **46.** 497-502. 6 figs. [Numerous refs.]

The author repeated a test of the filtrability of dog distemper virus. Judging from the ability of virus-containing tissues to fix complement, it would appear that the lymph nodes contain most virus. There is a suggestion that the greatest amount of virus is present in the tissues shortly after each temperature peak. It is claimed that virus was successfully grown in " drop " tissue cultures with spleen and lung mesenchymal cells, and that it was also grown in eggs.—E. J. Pullinger.

Hungerford, T. G. (1938). **A Note on Fowl Pox Virus Strains.**—*Aust. vet. J.* **14.** 197-198. [1 ref.]

On three farms H. observed outbreaks of fowl pox among birds which had been vaccinated four or five months previously. As a satisfactory reaction had occurred at that time, H. suggests that subsequent infection may have been due to a strain of fowl pox virus immunologically distinct from that in the vaccine. Material has been submitted to the laboratory so that this possibility may be further investigated.—T. S. Gregory.

DETTWILER, H. A., & MARKHAM, F. S. (1938). **A Study of the Bacteria Occurring in Commercial Fowl-Pox Vaccine.**—*Poult. Sci.* **17.** 46-48. 2 tables. [5 refs.]

20 samples of fowl pox vaccine were studied bacteriologically. A list of the bacteria isolated is given, and of these only one has been recorded as pathogenic to poultry, *i.e. Pseudomonas aeruginosa*. The others were types which are found naturally associated with healthy birds. Three unidentified species proved non-pathogenic in large doses to 8-weeks-old chicks.

The authors conclude that the U.S. federal regulation requiring a test by the intraperitoneal and intratracheal injection of fowl pox vaccine into young healthy cockerels with 10 times the normal dose is sufficient safeguard in the prevention of post-vaccinal diseases, especially when it can be shown that the bacteria isolated from the vaccine are non-pathogenic.—L. E. HUGHES.

CLAUDE, A. (1939). **The Enhancing Effect of Azoproteins on the Lesions Produced by Vaccine Virus, the Shope Fibroma Virus, and the Agent Transmitting Chicken Tumour I.**—*J. exp. Med.* **69.** 641-648. 7 figs. on 2 plates, 3 tables. [10 refs.] [Author's summary copied *verbatim*].

It is known that azoprotein solutions, like testicular extracts, possess the property of causing particles to spread through the dermis. The present work shows that azoproteins exhibit, like testicular extract, the power to increase the size of virus lesions in the skin of rabbits, and the size of tumours in chickens. The results indicate that the extent of the lesion is roughly proportional to the spreading power of the solution. This suggests that the spread of the infective material, over a large area of skin, is directly responsible for the enhancing effect.

The production of extensive lesions by means of spreading agents may have a practical value when large amounts of working material are needed.

I. PENSO, G. (1933). Intorno a una particolare entità morbosa (riferible al gruppo delle febbre esantematiche ?) da me riscontrata nell'alta Savoia (Francia). [**Notes on an Exanthematic Fever (Swineherds' Disease) Found in Upper Savoy, France**].—*Boll. Accad. med., Roma.* **60.** 13-23.

II. URECH, E. (1933). La maladie des jeunes porchers. [**Swineherds' Disease**].—*Schweiz. med. Wschr.* **63.** 44-45. 2 figs.

III. DEMOLE, M. (1934). [**Swineherds' Disease**].—*Rev. méd. Suisse rom.* **54.** 655.

IV. URECH. (1934). [**Swineherds' Disease**].—*Ibid.* 649.

V. BOUCHET, H. (1935). Relation sur la typhoméningite des porchers (maladie des fruitiers). [**Report on Typho-Meningitis of Swineherds —Swineherds' Disease**].—*Boll. Accad. med., Roma.* **61.** 410-412. [In French].

VI. BOUCHET, L. (1935). Notes cliniques sur la maladie des fruitiers. [**Clinical Notes on Swineherds' Disease**].—*Ibid.* 413-416. [In French].

VII. GIORGI-ERAGNE. (1935). Premières recherches de laboratoire sur la maladie des fruitiers. [**Preliminary Research on Swineherds' Disease**]. —*Ibid.* 417-420. [In French].

VIII. PENSO, G. (1935). Ulteriori notizie sulla particolare entità (Maladie des fruitiers) da me riscontrata nell-alta Savoia (Francia). [**Swineherds' Disease as seen in Upper Savoy, France**].—*Ibid.* 404-409.

IX. ANON. (1936). Malattie nuove : la meningite dei porcai. [**A New Disease : Porcine Meningitis—Swineherds' Disease**].—*Clin. vet., Milano.* **59.** 621-624.

X. Bocca, C. R. (1936). Un cas de méningite bénigne des porchers. [**A Case of Benign Meningitis of Swineherds—Swineherds' Disease**]. —*Lyon méd.* **158.** 730-733. [4 refs.]

XI. Bouchet, L. (1936). Nouveaux cas de méningotyphus des porchers en Haute-Savoie. [**Further Cases of Meningo-Typhus of Swineherds (Swineherds' Disease) in Upper Savoy**].—*Boll. Accad. med., Roma.* **62.** 430-431. [In French].

XII. Campanacci, D. (1936). La malattia dei porcai (pseudotifo-meningite dei fruitiers): qualche primo rilievo in Provincia di Parma. [**First Cases of Swineherds' Disease in Parma, Italy**].—*G. Clin. med.* **17.** 546-553. 1 graph. [5 refs.]

XIII. Campanacci, D. (1936). La malattia dei giovani porcai in Provincia di Parma. [**Swineherds' Disease in Parma Province, Italy**].—*Scritti in Onore del Prof. Angelo Ceconi in Occasione del trentesimo anno di insegnamento.* pp. 65-68. 1 graph. [12 refs.] Turin: Minerva Medica.

XIV. Charleux. (1936). La méningite bénigne des porchers. [**Benign Meningitis of Swineherds—Swineherds' Disease**].—*Pr. méd.* **41.** 346.

XV. Durand, P., Giroud, P., Larrivé, E., & Mestrallet, A. (1936). Recherches expérimentales sur la maladie des porchers. [**Experimental Research on Swineherds' Disease**].—*Mouvem. sanit.* **13.** 531-537.

XVI. Lesné, E., & Boquian, Y. (1936). Méningites lymphocytaires curables chez l'enfant. [**Curable Infantile Lymphocytic Meningitis**]. —*24me Congr. franç. Méd. 1936.* pp. 121-188. [Numerous refs.] Paris: Masson et Cie.

XVII. Penso, G. (1936). Meningotifo eruttivo, sporadico, benigno, a carattere professionale (Maladie des fruitiers). Riassunto. [**An Occupational Disease, Benign Sporadic Eruptive Meningo-Typhus—Swineherds' Disease**].—*Boll. Accad. med., Roma.* **62.** 235-236.

XVIII. Penso, G. (1936). Le méningo-typhus eruptif des porchers. [**Eruptive Meningo-Typhus of Swineherds—Swineherds' Disease**].—*Mouvem. sanit.* **13.** 508-530.

XIX. Penso, G. (1936). Prima inchiesta epidemiologica in Italia sul meningotifo errutivo dei porcai. [**First Epidemiological Investigation in Italy on Swineherds' Eruptive Meningo-Typhus—Swineherds' Disease**].—*Boll. Accad. med., Roma.* **62.** 432-437.

XX. Raymond, M. (1936). Sur un cas de Méningite bénigne des porchers. [**A Case of Benign Meningitis of Swineherds—Swineherds' Disease**]. —*Progr. méd., Paris.* Sept. 5th. 1396. [Also appeared, almost *verbatim*, in *Monde méd.* **47.** 782-783 (1937)].

XXI. Roch, M. (1936). Les méningites aigües bénignes de l'adulte. [**Acute benign Meningitis of Adults**].—*24me Congr. franç. Méd. 1936.* pp. 5-119. [Numerous refs.] Paris: Masson et Cie.

XXII. Wacker, T. (1936). De la maladie des jeunes porchers. [**Swineherds' Disease**].—*Thesis, Geneva.* pp. 81. 2 figs., 2 tables. [14 refs.]

XXIII. Charleux, G. (1937). La méningite bénigne des porchers. [**Swineherds' Disease**].—*Pr. méd.* **45.** 452-454.

XXIV. Durand, P., Giroud, P., Larrivé, E., & Mestrallet. (1937). Études sur la maladie des porchers (maladie de Bouchet). Premier et deuxième mémoires. [**Swineherds' Disease. I & II**].—*Arch. Inst. Pasteur Tunis.* **26.** 213-227 and 228-249. 7 figs., 1 table. [Numerous refs.]

XXV. Durand, P., Giroud, P., Larrivé, E., Mestrallet, A., & Bouchet, L. (1938). Études sur la maladie des porchers (maladie de Bouchet). Troisième mémoire. [**Swineherds' Disease. III**].—*Arch. Inst. Pasteur Tunis.* **27.** 7-17.

XXVI. Fatzer, Hedwig. (1937). Zur Frage der Meningitis serosa und der Maladie des jeunes porchers. [**Meningitis Serosa and Swineherds' Disease**].—*Schweiz. med. Wschr.* **67.** 709-713. 2 charts. [15 refs.]

XXVII. Lestoquard. (1937). Une nouvelle maladie professionnelle : la maladie des porchers. [**A New Occupational Disease : Swineherds' Disease**].—*Rev. Méd. vét., Toulouse.* **89.** 432-435.

XXVIII. Löffler, W. (1937). Beitrag zur " maladie des jeunes porchers " mit meningismus. [**Swineherds' Disease**].—*Schweiz. med. Wschr.* **67.** 194-195.

XXIX. Stähelin, R. (1937). Die Krankheit der jungen Schweinehirten. [**The Disease of Young Swineherds**].—*Ned. Tijdschr. Geneesk.* **81.** 315-320. [6 refs.] [In German].

XXX. Bouchet, H. (1939). Relation sur la Pseudo-Typho-Méningite des porchers. Maladie de Bouchet. [**Report on Pseudo-Typho-Meningitis —Swineherds' Disease**]. pp. 7. Annecy: Imprimerie Herisson Frères. [3rd Edit.]

[For earlier abstracts on this subject, see *V. B.* **7.** 219 and 528].

I. This appears to be the first scientific communication on the subject in Italy. P. described Upper Savoy, its climate and topography, the economy of the farms and the methods of collecting milk at the cheese factories ; there is also a short description of swineherds' disease (S.D.) in man. He discussed the possibility of transmission by rodents or ectoparasites. There is no description of the associated pig infection. [P. gave much fuller details in a later publication —*V. B.* **7.** 219., abstract VI of that group. The abstract of this article should be read before reading those of the series now published, as the latter are written on the assumption that the reader knows the syndrome as described by Penso and the association of human patients with pigs fed on by-products of certain cheese factories].

II. S.D. is apparently not rare, U. having observed 15 cases in the two years preceding the publication of this article. He supported Müller's observations [*V. B.* **7.** 219]. His own clinical experiences are here reported. The syndrome in man resembles that of dengue fever. Immunity after recovery is durable ; the disease is not contagious from man to man. All patients were young male swineherds working in piggeries associated with cheese factories. None came from farms ; all except one were newcomers to the work.

U. considers that the disease is transmitted by the pigs, or by the milk or its by-products (cheese, butter, etc.) Attempts to demonstrate a causal micro-organism had yielded negative results.

III. There is a note in the records of the meeting that D. described a case of S.D. in a young man employed in a piggery. D. discussed the disease, and stated that the only wide-spread pig disease of the country was " pneumo-enteritis ".

IV. A note to the effect that U. discussed S.D. at the meeting. In the discussion Menthonnex reported having seen similar cases in young Swiss dairy workers in 1931 and 1932.

V. B. referred to a case of S.D. seen in 1914, and gave details. He emphasized that the syndrome was different from that of tuberculous meningitis and of cerebrospinal meningitis. In 1919, when B. returned to his practice after the war, he saw another case. Since then he had seen at least 80 cases, which he discussed.

He had noticed that in the dairies concerned the cheeses were often bad, and were refused by the customers. Consequently at one time he had suspected the illness to be due to the ingestion of spoiled cheese. In 1928, after failing to find any obvious cause, B. observed a case which occurred simultaneously with illness in young pigs at the associated piggery. The affected animals showed symptoms of meningitis, and the carriage of their heads was abnormal. The illness was severe and the owner found that animals apparently dying were saved when blood was drawn from the tail. [Very little information was given concerning the pig disease]. B. described the syndrome in man, emphasizing that it runs in three phases. The first phase is characterized by intestinal phenomena, rigors, fever, and an eruption on the inside of the thighs, followed by a fall in the temperature. In the second phase the patient believes that he has recovered. In 2-3 days meningeal symptoms appear, announcing the third phase, and there is violent headache.

VI. B. had seen about 30 cases in ten years in his neighbourhood, and emphasized that it is strictly an industrial disease of swineherds working in piggeries attached to cheese factories [*V. B.* **7.** 220]. He described three cases in some detail.

VII. The author had been called in to do bacteriological work on cases of S.D. since 1933. Typhoid agglutination tests were negative. In one case on which he carried out blood cultures, agglutination tests for typhoid, *Brucella melitensis* and *Proteus* X 19, examination of stained slides [? blood] and inoculation of g. pigs all gave negative results.

VIII. P. discussed the syndrome in the human cases and mentioned a case in a swineherd whose pigs were healthy. He gave details of discussion between himself and Drs H. and L. Bouchet [See V & VI above] concerning the disease and the circumstances in which it occurs. He also gave details of a discussion with Dr Marquet, a practising veterinarian at Annecy. Dr Marquet had observed illness in young pigs in which there were symptoms of disease of the central nervous system associated with intestinal disturbances. These were commonly attributed to intestinal parasites, or to alimentary intoxication. The other diseases of interest in this connexion in the piggeries of the *fruitières* were paratyphoid enteritis, swine fever, and *maladies rouges*. P. proposed issuing a questionnaire, of which he gave details, to the cheese factories of the Geneva Canton and the Gruyère region, to collect information.

IX. An annotation concerning S.D. No information is given about the associated disease in pigs.

X. B. described illness in a swineherd that occurred in August, 1936, merely making a tentative suggestion that this case might have been S.D. He commented on the syndrome and circumstances of the patient. This illness occurred away from Savoy and Switzerland, and the piggery concerned was not connected with a *fruitière*. The piggery was well kept. B. suggested that the hypothetical associated pig disease is one hitherto unknown.

XI. B. described two human cases and referred to the leucocyte formula of the cerebrospinal fluid in this disease.

XII. C. described the circumstances in which the disease occurs in man and discussed the syndrome. All the cases seen had been in contact with pigs. In one instance C. was able to observe two pigs of the same litter which were looked after by the patient. One of the pigs was much smaller and thinner than the other and had a staring coat. It appeared to be ill, and died five days later. A cursory examination of material from the pig revealed pleural adhesions and some hepatic congestion. No other information was given as to the associated disease in the pigs concerned.

XIII. C. gave a general account of the human disease and described its occurrence in two young girls in charge of pigs. He referred to the work of ARMSTRONG and LILLIE [(1934). *Publ. Hlth Rep., Wash.* **49.** 1019.] on human lymphocytic choriomeningitis. No information was given concerning infection in animals.

XIV. A brief note which does not include any new information.

XV. The authors took blood from a human case on the fourth day of illness, defibrinated it and five hours later inoculated 25 c.c. intramuscularly into a healthy human being. After 12 days there was a rise in temperature and new passages were then made in human beings. The period of incubation in these experiments was 6-13 days (average 6 days), and the period of illness lasted 3-21 days (most often 7-12 days). The symptomatology was discussed. The authors emphasized that the disease caused by the inoculations closely resembled S.D., although there were differences. Further proof of specificity was produced by neutralization of their virus by the serum of a swineherd recovered from the disease. They suggest that a virus which produces such marked fever and always ends in recovery could be used for " pyrétothérapie " for certain mental disorders : the experiments they described were carried out on mental patients for this purpose.

Animal Inoculation Experiments.—Three pigs weighing 10-15 kg. were obtained from a known " clean " herd and inoculated intraperitoneally with 20-30 c.c. of blood from a human case. After 5-8 days all three pigs developed fever. Two were killed and their blood was virulent in tests on human beings, rats and mice. Brain material from one pig set up infection in a man. Two pigs were inoculated intraperitoneally, one with brain material from one of the above pigs and the other with blood. Both reacted ; the temperature remained below 39°C. for five days, ran at 40°-41°C. for five days, then dropped to 39°-40°C. for eight days, and finally again dropped below 39°C. While reacting, the animals lost their appetite and had diarrhoea and a cough. There were no other symptoms and there was no clinical sign of encephalitis.

The authors emphasized that the pig disease was not distinctive, and that for this reason its association with a human infection would be likely to pass without much comment.

Macacus rhesus monkeys were found to be less susceptible than man. One was inoculated with 20 c.c. of infective human blood, and after six days developed a temperature of 40°C. ; one inoculated simultaneously intraperitoneally and into the brain showed a trace of fever on the tenth day ; a third monkey inoculated from the first one remained well.

Two cats inoculated (intraperit.) with 10 c.c. of infective human blood developed a temperature of 40°C. or over after 6-8 days. One was killed on the second day of fever and its blood was infective on injection (intraperit.) into two other cats. Brain material from this cat was inoculated into another cat, with indefinite results.

One ferret inoculated (intraperit.) with virulent human blood developed a temperature of 40°C. on the seventh day and its temperature reached 41°C. on the 11th day. It was killed and spleen material from it was inoculated (intraperit.) into a second ferret, which became infected. The blood of the first ferret was also infective to a rat.

The rat was stated to be the best experimental animal. There is a first rise in temperature said to be due probably to the mass of heterologous albumins injected, but after an incubation period of 6-9 days the temperature ranges from 38°-39°C. or to 39·5°C. for 3-5 days ; there may be relapses after the return to normal and the temperature may be higher at the end of the second week of illness than at the

beginning. No rickettsia could be demonstrated in the appropriate tissues after inoculation (intraperit.) of the male rat. After intracerebral inoculation the period of incubation is 4-6 days. Blood, brain and spleen are infective.

The spermophile was a little less susceptible than the rat.

Infection was produced intraperitoneally in mice with blood of an infected pig with a period of incubation of 4-8 days. When inoculated intraperitoneally or under the conjunctiva there was elevation of temperature in rabbits after 7-9 days, but nothing else. It is to be doubted whether the rabbit is susceptible. No indication could be found that the g. pig is susceptible.

Virulence of Body Fluids.—In human beings, blood was virulent from the second to the sixth days ; cell-free plasma was virulent ; plasma passed through an L2 candle was infective. Virus was not constantly present in cerebrospinal fluid. The urine of human cases was infective after a few days of illness ; the urine of pigs was constantly infective. Faeces were virulent in the experiments performed. In rats (small scale experiments) the introduction of suspension of infective spleen into the conjunctiva, nose and mouth caused infection. A rat and a cat were fed on infective rat-organs and contracted the disease.

The authors tried to produce infection with pig lice taken from a recently infected piggery, but all the results were negative.

XVI. There is single reference to S.D. in the course of an extensive review on curable infantile lymphocytic meningitis.

XVII. The article is mainly a short description of the human infection. P. suggested that the disease is probably transmitted from the pig to man by an intermediate host which does not fly and which is an obligatory parasite, for example a louse or a tick.

He considers that the disease is an exanthematic fever and calls it eruptive meningo-typhus.

XVIII. P. speaks of concurrent disease in the pigs when cases of S.D. occur. He nearly always found that when there were human cases, there was a history of illness among the pigs tended by the patient. Among examples of cases was that of a girl who took over the work of a swineherd in a *fruitière* and contracted S.D. Another girl took over the duties and she also contracted the disease. Only piglets 1-2 months old are affected. After slight intestinal disturbance, which is variable, there are epileptiform fits with excitement, salivation, sometimes epistaxis, trismus, rigidity and tension of the neck, and pleurosthotonos.

The attacks occur especially at feeding time. The affected animals approach the trough, stop as though frightened, twist their heads and roll over (the Savoyards speak of the pigs having *le tourniquet*). Sometimes the animals jump and fall on their backs kicking their feet. The attack lasts 5-6 minutes. The disease lasts for about a fortnight and the animals become emaciated ; the mortality is low. The syndrome is well known locally and has local dialect names (" balordon " in the Parma Province and " mal mazûch " in the Reggio Emilia Province, Italy).

The disease was studied on one occasion during an epidemic at Villa San Manrizio, in the Commune of Reggio Emilia—by Dr Poli, chief veterinary officer of the town. There were 70 two-month-old piglets in the piggery and most of them were affected ; one died and 18 were killed for examination ; the remainder recovered completely. At autopsy no lesions were present in the abdomen except an anaemic appearance of the liver and kidneys. There was no abnormality in the thorax. Lesions were present in the central nervous system. There was slight reddening of the meninges of the spinal cord and an excessive amount of cerebro-spinal fluid which was of a reddish-yellow colour. Macroscopic examination revealed nothing abnormal on section of the spinal cord. The meninges of the

brain were reddened and the blood vessels of the brain cortex were injected. On section of the brain, capillary haemorrhage was observed in several subjects ; there was change in the consistence of the grey matter and in some subjects hardening of the ganglion zones. No bacteriological examinations and no histological examinations were made.

P. felt sure that this pig disease was related to the human condition. Locally it was attributed to intestinal worms but he suggested that the worms could not be responsible, and thought that the disease in the pigs was infectious. He said that it could not be any of the well-known pig diseases and that it was not porcine influenza. Local veterinarians who had considered the pig condition had suggested that it might be swine fever. P. said however that it was very different from S.F. The disease in question does not occur as an epizootic, but mostly as sporadic cases. The mortality in the pigs is only about 2%.

P. suggested that the processing of the milk for cheese making might have something to do with the development of the disease in the pigs. In Emilia pigs are fattened, and there is no breeding ; the animals are purchased at 4-8 weeks old, being obtained from places in Tuscany. In these areas in Tuscany, where no skim milk is fed, there are no cheese factories and the disease does not occur. Incidentally, S.F. had been wide-spread in Tuscany, a further argument that S.D. is unrelated to it.

P. suggested that the use of skim milk as a basal ration might influence the incidence of the disease by exalting a saprophytic virus that exists in the pigs. He emphasized that the human disease is not contagious from man to man and that cases occur sporadically without any direct relation to each other. This is the case in spite of the fact that when one case occurs in a *fruitière*, no precautions are taken and there is much opportunity for close contact with the infected surroundings.

Similarly, P. argued, the disease is not directly transmissible from the pig to man. People merely living near the piggeries do not contract the disease. Pig dung is used as manure, yet those using the manure do not become affected, though they often handle it when it is fresh. Moreover, the disease does not occur in the families of the swineherds. It was suggested that this indicates the operation of an intermediate host, and probably not a winged one : the pig louse was suspected.

P. compared S.D. with lymphocytic meningitis referring to the review by Roch [see XXI, below].

XIX. The matter in this paper is included in XVIII, above.

XX. R. saw what he considered to be a case of S.D. at Oued Zem, Morocco. The patient had had nothing to do with pigs, but ate a great deal of pork and *fromages fermentées*. No other details are given relating the case to pig infection and the diagnosis rested purely on the clinical picture.

XXI. A very detailed general review of acute benign meningitis of adult human beings. One page of this extensive article is devoted to S.D. and the information given concerning it is of a general nature.

XXII. W. who was a pupil of Roch [see XXI] gives credit to L. Bouchet for the recognition of the disease. He says, however, that Müller (1932) and Urech (1933) gave the first clinical description of the disease and that Penso [see I] did not know of the papers of Müller and Urech when he gave his account of the disease in 1933. W. is of the opinion it is not possible to say whether S.D. is a new disease transmissible to man, and suggests that it may possibly be due to a saprophyte of pigs recently become a pathogen. He describes three cases.

W. investigated the geographical distribution of the disease and gives some details concerning its incidence in France and Switzerland in five dairy institutions. The incidence reported was :– (1) four cases a year out of 20 pupils ; (2) three cases in one month ; (3) two cases ; (4) four cases a year out of 12 pupils, and (5) 15 cases altogether.

He reports that eleven medical men had knowledge of the disease in their respective areas in Switzerland and France, and seven of them gave information on 80, over 20, 12, 7, 5, 5, and 4 cases respectively ; one or two had seen cases the number of which is not stated.

In one practice three brothers at a *fruitière* contracted the disease at six-monthly intervals. In another instance a mechanic who had never been in contact with pigs cleaned pigsties and became infected a fortnight later. A carpenter did some work in a piggery and became affected. An 11-year-old boy stayed a short time at a *fruitière* and contracted the disease.

W. states that centres of infection are very numerous in Upper Savoy, and that the disease can be traced back for 12 years in Switzerland. It occurs frequently in Vaud and Berne, and is also seen, but more rarely, in Geneva. It does not occur in dairies or cheese factories where pigs are not kept.

W. had great difficulty in obtaining information, as pig keepers do not like enquiries concerning the pig disease. Dr H. Bouchet has seen an obscure pig disease associated with swineherds' disease and spoken of *meningotyphus des jeunes porcs* in which there are digestive disturbance and meningitic affection. Dr Marquet, a veterinary practitioner at Annecy, also knows of a disease of young pigs with these symptoms.

XXIII. C. speaks of 11 cases he has seen since 1927 and describes the syndrome. Eight of the cases were associated with *fruitières*. Cases occur most commonly on the French-Swiss frontier, in the cantons of Vaud and Berne, and rarely, in the Cantons of Geneva or Fribourg. They are seen sporadically in the Department of Savoy, in the Upper Loire and in Italy in the Parma region. They occur at all seasons, but are more frequent in summer.

The patients' employment seems to bethe most important predisposing cause. Transmission probably occurs from pig faeces, and an intermediate host, possibly the rat, may play a part.

In rare cases pigs presumed to be responsible for the infection actually have " meningo-typhus ", but it is probable that pigs may be affected and infective without showing marked illness. As a rule, when human cases have occurred, there have been no epizootics of well-known pig disease.

XXIV. Much of the matter in this article has been published already though in less detail [see XV, above].

The authors discuss chorio-meningitis [see review by Roch, XXI p. 777]. They emphasize that H. Bouchet [see V above, XXIX p. 781] was the first to recognize the disease, and they give a good review of the literature.

They describe an extensive series of inoculations with infective blood from a human case administered to 78 lunatics intramuscularly to induce a curative pyrexia, the inoculations involving considerable passage of the virus through human beings and animals. Details of the reactions in these persons are given. Pyrexia occurred regularly for a few days after an incubation period of about eight days. Some of the individuals were given virulent material at a later date to ascertain if immunity had developed, and this was usually the case. The bi-phasic curves described by Penso [*V. B.* **7.** 219, abstract VI] did not occur.

In these experiments on human beings the virus was nearly always present in the blood on the seventh day after inoculation. It was present in cell-free

plasma and passed an L2 filter. The cerebrospinal fluid of these artificial cases contained virus on some occasions, but not on others. When tested urine was infective.

The authors discuss the usual method of infection. Lice are common on the pigs in the affected districts, but human cases have occurred when the associated pigs were definitely free from lice. Abattoir workers are frequently bitten by pig lice in the course of their work, but they do not contract S.D.

Attempts were made to transmit the disease to human beings by permitting lice to feed after an infective meal, and by inoculating material obtained by grinding up such lice, but always with negative results. When tested later by the inoculation of virulent blood these experimental subjects were not immune.

In experiments carried out, faeces of affected human beings and pigs were infective. The authors describe an instance where a lunatic became infected after handling bedding soiled with faeces from an experimental human case and another where the infection was considered to have been acquired through handling pig faeces.

XXV. The authors discuss theories which have been advanced concerning the manner in which human beings are infected.

Lice (*Haematopinus suis*) are common on the pigs of the affected areas. Severe illness in pigs can develop from louse infestation and this louse will bite man. The authors give examples of *fruitières* in which cases of S.D. had occurred and louse infestation was severe, moderate and absent (only one example of each).

They had difficulty in accepting owners' statements that there were no lice on their pigs, as this may have been said to avoid trouble with the authorities on hygienic grounds. The authors, however, quote Bocca [see X p. 774.] and emphasize that he was well acquainted with the subject and was able to state that the pigs associated with the case he described were free from lice. [B. only saw one human case and merely suggested that it probably was swineherds' disease. The patient came from a piggery that was not related to cheese making].

Experimental Work.—Attempts were made to infect human beings by bites of *Haematopinus suis*, or by ground-up lice instilled into the conjunctiva, or placed on scarified skin, or inoculated subcutaneously. Lice were collected from infected *fruitières* and from the Paris and Lyon abattoirs, those collected from the abattoirs being fed on artificially-infected pigs. Test persons were lunatics submitted to pyretotherapy.

Eight hungry lice and 3 days later another 20 hungry lice, were allowed to feed on a human being. The patient remained in good health for a month. He was then inoculated (subcut.) with virulent blood and developed the disease.

2-3 drops of ground suspension of about 15 lice (integument previously cleansed) were placed on the conjunctiva of a human being (neither conjunctiva nor cornea scarified); on the same day he also received a similar suspension subcutaneously. Three days later another conjunctival dose from other lice was given. The suspension was also applied to a scarified area on the forearm. There was no reaction for a month. The subject was then given a dose of virulent blood subcutaneously, and developed the disease.

For the next experiments the following procedure was adopted :– a pig was inoculated (intraperit.) with virulent blood, killed in ten days at the height of the reaction and its blood inoculated into a man, and also into another pig : then a box containing clean pig lice was fixed to the skin of the latter pig and 12 days later surviving lice were used for experiments A, B and C.

A. A human being was bitten by four of the lice, four days later by two lice in the morning and eight in the evening, the lice used this day having been collected

from pigs in a *fruitière* on which a case of S.D. had occurred. [No information given as to health of pigs]. Again, one day later (5th day) the patient was bitten by three newly-hatched lice from nits laid in the box, attached to the pig, and by three lice from the above *fruitière*. The subject remained healthy, but he acquired the disease when given a test inoculation a month later.

B. A human being was given (subcut.) a suspension of four ground-up lice that had just bitten the lunatic used for experiment A on the day he was first exposed to the bites. There was no reaction, but the patient reacted to a test inoculation given a month later.

C. A suspension of 12 ground-up lice, from the box on the pig, was inoculated on to both conjunctivas of a human being, after light scarification. There was no reaction, but the patient reacted to a test inoculation given five weeks later.

D. 14 ticks were collected from a Paris abattoir and put on an infected pig the day fever started (the pig having been infected from human infected blood); after 14 days on this pig lice were ground up and inoculated subcutaneously. No reaction occurred; the patient reacted to a test dose given a month later.

Thus the authors were not able to produce evidence incriminating the louse. They considered, however, that these experiments do not dispose of the louse infection theory.

Another theory is that human beings are infected from pig faeces. Penso had emphasized that those who nursed the patients and washed their linen, often with no precautions, never got the disease. The authors demonstrated that the virus is in the faeces of human and pig cases, and gave two instances that confirm this view.

The first occurred in a well-run piggery that could be taken as a model for management; it was in the Lyon region where no S.D. had been seen. A lunatic was working there. He was in good health and suddenly became ill with S.D. On recovery he was given an infective dose that infected a control lunatic, but he did not react. Later it was found that the lunatic in question had used as bedding for his pigs the contents of mattresses soiled with faeces by paralysed patients used in the authors' infection experiments; this was the only contact with infective material. The pigs never showed any illness; the lunatic must have contracted the disease through handling straw soiled by excrement from the experimental human cases.

The second instance of infection from faeces was of a farmer who contracted S.D. He had had no direct connexion with pigs. It was found that one of the fields which he cultivated lay at a lower level than a piggery 80 metres away and at which there had been a case of the disease in 1936. The lease of the field included the right to manure with sewage from the piggery, which was conveyed to the top of the field by a drain. 15 days before the patient became sick he dug over this field, which at the time was marshy and foul-smelling with the accumulation of sewage from the piggery, which had been washed into the field by recent rain. The work took more than one day and his hands were chapped and came in contact with the pig dejecta; his face was probably also splashed with infective material.

XXVI. F. discusses the syndrome of S.D. and compares it with lymphocytic choriomeningitis as described by Roch [see XXI p. 777]. She reviews the 18 cases of meningitis serosa which had been treated during the previous ten years at the Basle University Clinic. Of these, two were of interest in relation to S.D.

(1) A swineherd from a large piggery near Basle. A pig died after one day's illness with a temperature of 41°C. The patient opened up the pig to examine it and noticed that there were inflammatory lesions. No veterinary aid

was sought. The patient's illness began the next day, and the day after that a second pig sickened and died. F. got a piglet from the piggery six days after the man sickened. She was unable to get pigs for inoculation, but attempted to infect rabbits, g. pigs and mice from it, all with negative results.

(2) This case occurred a fortnight before the one described above. A young man at the end of a brief period of military service lay down for half an hour in an empty wooden vat by a piggery and became ill three days later. The vat had been used for scalding pig carcasses. There was no further history to incriminate infection from pigs, but F. heard later that there had been swine fever at the piggery earlier in the year.

Very complete details are given of the results of observations on the human patients.

Enquiries made concerning pig disease in the neighbourhood of Basle that might be associated with human illness did not yield any real information. Some suspicious human cases were traced, but the information available was never sufficiently detailed to be of value. Similarly, accounts received concerning pig disease did not yield exact information to support the belief that a hitherto unknown disease had existed. In many cases no veterinary aid had been enlisted and no skilled evidence was available. Swine fever had been prevalent. There were, however, reports from laymen of a pig disease of a meningitis type.

XXVII. In a brief note L. points out that veterinarians may contract S.D. in the course of their duties. The pig disease from which the human patients are presumed to contract infection is not well understood and requires investigation. In the regions affected it is known as *méningo-typhus de porc*, the affected animals showing intestinal and meningeal disturbances, while pleurothotonos is a notable symptom. Human beings appear to contract the disease after repeated and habitual contact with presumably affected pigs and circumstantial evidence suggests the operation of an intermediate host, *Haematopinus suis* being under suspicion. L. suggests that the disease belongs to the exanthematic typhus group.

XXVIII. A brief description of a case.

XXIX. A brief general review of S.D. literature prompted by seeing the two cases described by Fatzer [see XXVI, p. 780]. The history and syndrome of the two patients are described in some detail. S. comments on the resemblance of the illness in these two patients to meningococcus infection and to tuberculous meningitis.

A pig was obtained from the piggery in which the first patient worked ; it became ill a few days later, and was examined by Professor Dörr and Dr Seidenberg. However, inoculation results were negative and so were the results of P.M. examination. The canton veterinary surgeon, Basel, suggested that the disease was swine fever ; S. found that there had been swine fever at farms concerned in the second case, but he doubted if the disease was really swine fever, and suggested that it was some other hitherto unknown infection.

XXX. [This is marked Third Edition. There is another, but undated, publication in different format, but identical as to wording except that the 1939 edition has " Maladie de Bouchet " added as a sub-title. It is likely that current usage concerning the date of printing and the number of the edition was not followed in the earlier editions. The undated publication is referred to by Durand, Giroud, Larrivé and Mestrallet [see XXIV, p. 778.] and by other authors as the earliest one on the subject, but no evidence as to date of publication can be found].

The material in this article is the same as in V.

BURNET, F. M., & FREEMAN, M. (1938). **"Q" Fever: Factors Affecting the Appearance of Rickettsiae in Mice.**—*Med. J. Aust.* Dec. 31st. 1114-1116. 3 tables. [2 refs.]

The authors demonstrated the importance of the time which should be allowed to elapse following inoculation of mice with material suspected of containing the rickettsia of "Q" fever, before spleen smears are examined or agglutination tests performed. After the optimal period, rickettsia in the spleen and liver rapidly diminish in number and fail to induce demonstrable infection on subinoculation. Agglutinins appear in mouse blood about seven days after inoculation. Irradiation of mice with just sub-lethal doses increases the intensity of infection with "Q" fever rickettsia.—T. S. GREGORY.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

GILL, D. A., & GRAHAM, N. P. H. (1939). **Studies on Fly Strike in Merino Sheep. No. 1.—The Effect of Mules' Operation on the Incidence of "Crutch" Strike in Ewes. No. 2.—Miscellaneous Observations at "Dungalear" on the Influence of Conformation of the Tail and Vulva in Relation to "Crutch" Strike.**—*J. Coun. sci. industr. Res. Aust.* **12.** 53-70 and 71-82. 17 tables, 2 graphs. [13 refs.]

I. Previous observations on Mules' operation for the removal of skin folds (wrinkles) from the "crutch" region of sheep are reviewed. An extensive field trial is described and results are summarized in tables. The technique of the operation is fully described. The operation, properly performed, was highly successful as a means of reducing the incidence of "crutch" strike. In an experiment involving 650 sheep, over a period of 14 months, there were 13-22 "crutch" strikes among the control (untreated) sheep for every one such strike among those on which the operation had been performed. The necessity for re-treatment of a small percentage of sheep that were not adequately dealt with on the first occasion was clearly shown.

The operation is quickly and easily performed, causes only transitory pain, and the wounds heal with remarkable rapidity. While the wounds themselves do not appear to be attractive to blowflies, it is considered that the operation should not be performed during a period when blowflies are actively striking the sheep, nor in the summer months when the wounds are liable to serious irritation from bush flies (*Musca spp.*).

II. The observations recorded deal with factors, other than the presence of "crutch" skin folds (wrinkles), which have been stated to increase susceptibility to fly strike in the breech area. Minor degrees of deflection of the vulva, commonly encountered among ewes, had no relation to strike incidence. While further careful observations are required to determine the best principles to follow when docking the tails of lambs, observations recorded in this paper suggest that less trouble from fly strike is to be anticipated from docking the tail long than from cutting it too short. A very close association was noted between the extent of crutch skin fold development and tail skin fold development.

In the light of these observations the authors see no reason why Mules' operation of fold removal should not be utilized for the reduction of crutch strike in merino flocks concurrently with a breeding policy designed to eliminate the more wrinkly-breeched sheep.—H. McL. GORDON.

EICHLER, W. (1937). Untersuchungen zur Epidemiologie der Aussenparasiten. I. Federlöcher und ihre Deutung. [**The Epidemiology of Ectoparasites. I. Holes in Feathers caused by Parasites**].—*Arch. wiss. prakt. Tierheilk.* **72.** 230-234. 6 figs. [Numerous refs.]

E. states that by puncturing the quill of growing tail feathers in pigeons he succeeded in reproducing defects in the barbs similar to those which were described by HENRY and LEBLOIS [*Rec. Méd. vét. exot.* **99.** 396.] in 1923, and which were attributed by them to the agency of the pigeon mite (*Falculifer rostratus*). From these experiments he infers that such defects in the feather barbs are the result of mechanical injury to the quill of the developing feathers, or possibly also to constitutional disturbance.

STENDER, Margarete. (1938). Milbenerkrankungen unserer Haus- und Nutztiere. [**The Injuries Caused to Domestic Animals in Germany by Mites and Ticks (a General Survey)**].—*Z. hyg. Zool.* **30.** 255-264 and 281-290. 11 figs. [16 refs.]

A summary, in popular language, of the principal forms of mite and tick infestation in horses, cattle, sheep, pigs, silver foxes, rabbits and poultry. Types of the genera *Sarcoptes*, *Chorioptes*, *Psoroptes* and *Dermanyssus* are described, with the symptoms and results of infestation and the common methods of control. Brief notes on poultry infestation by *Argas reflexus* and on infestation of domestic animals by *Ixodes ricinus* are also given.—J. MACLEOD.

OSWALD, B. (1939). Ponte du *Rhipicephalus bursa* dans des conditions favorables. [**Oviposition by *R. bursa* under Favourable Conditions**].—*Ann. Parasit. hum. comp.* **17.** 170-173. 1 fig., 1 table.

Under suitable conditions of moisture and temperature, oviposition by fully and partially gorged female *R. bursa* ticks was found to follow a constant type of curve, the daily egg output reaching its maximum in 2-6 days, after which it dropped gradually during the next 10 days or so to a very low level, at which it remained until the 21st-23rd day, when oviposition ceased. Changes in the daily output or shape of the output curve were not affected by fluctuations in barometric pressure.—J. MACLEOD.

PARASITES IN RELATION TO DISEASE [HELMINTHS]

HENRY, A. (1937). Prophylaxie des helminthoses. [**Prevention of Helminthiases**].—*Rec. Méd. vét.* **113.** 728-743. 4 figs.

Reference is made to the existing methods of controlling parasitic diseases. The different evolutionary phases of the most important parasites are described, together with a summary of the general prophylactic measures that may be employed in controlling parasitic diseases.—A. L. WILSON.

CAMPBELL, D. H. (1937). **The Immunological Specificity of a Polysaccharide Fraction from Some Common Parasitic Helminths.**—*J. Parasit.* **23.** 348-353. 1 table.

A method for the isolation and purification of a polysaccharide fraction of helminths is described. The fractions from the different worms are similar in their qualitative chemical properties. Rabbit antisera were prepared against certain of the helminths to test the polysaccharides by means of the precipitin ring test. The polysaccharide fractions exhibit far greater specificity than do saline

extracts of whole worms ; the latter react to heterologous sera, whilst the former react only to homologous antisera. Thus, C. showed that *Ascaris lumbricoides* and *A. suum* differ antigenically as well as biologically. No cross reactions occurred between the ascarids and tapeworms.—M. L. BINGHAM.

I. WERTHEIM, P. (1938). Istraživanje metiljavosti. Galba truncatula u okolici gračaca, mogucnost njezina suzbijanja i njezino značenje za metiljavost. [*Galba truncatula* **in the District of Gracac (Western Yugoslavia). Its Possible Control and Its Significance in Relation to Liver Fluke Disease**]. —*Jugoslov. vet. Glasn.* **18.** 95-105. 5 figs., 5 tables, 1 map. [6 refs.]

II. MARTINCIC, M. (1938). Neobični tok i neobični patološko anatomski nalaz metiljavosti godine 1936 i 1937. [**Unusual Course and Unusual Findings of Liver Fluke in 1936 and 1937**].—*Ibid.* 149-153. 2 figs.

III. MIRKOVIC, M., & BUTOZAN, V. (1938). Metiljavost ovaca 1937 god. u Podraškom Polju srеza Mrkonjic - Grada Vrbaske banovine. [**Liver Fluke Disease in Sheep in 1937 in the Valley of Podraska, Mrkonjic-Grad District, Vrbas Province**].—*Ibid.* 186-191. 2 tables, 1 map.

IV. WERTHEIM, P., & RUKAVINA, J. (1938). Istraživanje metiljavosti VII. Nalazišta, životni uslovi metiljskog puža i metiljavosti u srezu Gospic. [**Factors Governing the Life of the Liver Fluke Snail and Its Distribution. Liver Fluke Disease in the District of Gospic**].—*Ibid.* 355-373. 4 figs., 9 tables, 1 map, 1 diagram. [10 refs.]

I. The district of Gracac was examined for *G.t.* throughout 1937. This snail was found chiefly in swamps (so-called *pistalina*), and also, but not so frequently, in other kinds of pastures. The habitats of the snail are static, but they are distributed more or less irregularly over the district. *G.t.* is the only host snail of the liver fluke in the area, and rather a large proportion of infested snails are found. The most intensive development of the snail takes place in spring, and its life does not exceed four years ; attempts at control should therefore take place in late spring and early summer.

II. Many cases of acute fatal diseases of cattle occurred in the autumns of 1936 and 1937 in certain parts of Croatia and Bosnia. There were symptoms of acute peritonitis and pleuro-pneumonia and the P.M. findings included fibrinous adhesive perihepatitis and peritonitis, and abundant peritoneal exudate (up to 40 litres). The liver was perforated and severely damaged by the emergence of liver flukes from its surface and the organ contained numerous flukes internally.

III. An unusually severe outbreak of liver fluke disease in sheep occurred in the autumn of 1937 in the district of Mrkonjic-Grad in Bosnia. Unaffected sheep were treated with " protumetilj " capsules (a CCl_4 preparation made at the State Veterinary Experiment Station, Zagreb) with encouraging results.

IV. *G.t.* is distributed all over the northern coast of Gospic, western Yugoslavia, chiefly on heavy, damp soil. It lives in this district under different circumstances from those in the neighbouring district of Gracac [see I, above], its habitat in Gospic being generally a brook rather than a swamp. It is worth noting that here the snail is sometimes found clinging to stones, which evidently enable it to survive dryness more easily. Here also *G.t.* is the only vector of the liver fluke. Owing to the heavy losses caused by the liver fluke throughout Yugoslavia, the establishment of a committee for liver fluke control is suggested.

—B. OSWALD (KRIŽEVCI).

LÜTJE. (1938). Leberegelerkrankungen beim Reh im Regierungsbezirk Stade. [**Liver Fluke Disease in Deer in the District of Stade**].—*Dtsch. tierärztl. Wschr.* **46.** 769-772. [7 refs.]

A general paper dealing with fluke disease in deer. A description of the pathology and clinical symptoms is given.—A. L. Wilson.

Hsü, H. F., Du, S. D., & Chow, C. Y. (1938). **On Two Species of Trematodes** [*Microtrema* **and** *Metorchis*] **from the Liver of the Cat in China.**—*Bull. Fan. Inst. Biol. Peking.* Zool. Ser. **8.** 1-8. 1 text fig., 14 figs. on 1 plate, 2 tables. [5 refs.] [In English : Chinese summary].

Microtrema truncatum is recorded for the first time in the cat ; it was found in the gall-bladder. The authors consider that *Metorchis* found in dogs and cats in China should be regarded as a distinct species, *Metorchis felis*, because of certain morphological features which distinguish it from *Metorchis albidus*, the European species.—A. L. Wilson.

Florence, R. (1939). Existence chez les bovins de Madagascar de l'*Eurytrema pancreaticum*. [*E. pancreaticum* **in Cattle in Madagascar**].—*Bull. Soc. Path. exot.* **32.** 446-447.

It is stated that the parasite has not previously been recorded from Madagascar. Examination of the pancreas of cattle in the abattoirs revealed that it was very common and most of the affected animals were calves. Animals reared on or near the coast harboured more parasites than those reared on the higher lands.

—A. L. Wilson.

Shaw, J. N., & Howarth, C. R. (1939). **Immunity to Salmon Poisoning Follows Treatment of Affected Dogs with Sulfanilamide.**—*N. Amer. Vet.* **20.** No. 5. 67-68. [2 refs.]

Particulars are given of one dog that was fed parasitized salmon, was treated with sulphanilamide and recovered, and on being again fed parasitized salmon was not affected. It is stated that two other dogs were treated in the same manner as the first one, but no details of the treatment of these are given. Control animals were used but no particulars are given as to how they were dealt with.—W. J. I.

Levine, P. P. (1938). **The Effect of Infection with** *Davainea proglottina* **on the Weights of Growing Chickens.**—*J. Parasit.* **24.** 550-551. 1 table.

A group of seven-week-old chickens was experimentally infected with *D. proglottina*. From the 35th day until the end of the experiment on the 136th day after infection, they showed a lower weight increase than the non-parasitized control birds, although the food intake of both groups was practically identical.

—M. L. Bingham.

Buck, G. (1939). Un parasite des poules nouveau pour Madagascar : *Tetrameres fissispina*. [*T. fissispina* : **a New Fowl Parasite in Madagascar**].—*Bull. Soc. Path. exot.* **32.** 447-448.

The parasite was found singly or in association with another parasite, *Acuaria spiralis*, in the proventriculus of various breeds of poultry. In heavy infestations the wall of the stomach was thickened, the mucous membrane was congested and the birds were emaciated.—A. L. Wilson.

Christiansen, M. (1938). Igler (Protoclepsis tesselata O. F. Müller) som Aarsag til Sygdom, bl. a. Konjunktivitis, hos Gaes og Aender. [**Leeches** (*Protoclepsis tesselata*) **as a Cause of Conjunctivitis in Geese and Ducks**].—*Maanedsskr. Dyrlaeg.* **50.** 409-425. 4 figs. [19 refs.]

A flock of young geese, which had free access to a muddy pond, were observed

in June to July to be affected with severe conjunctivitis with muco-purulent discharge from the eyes. The cause of the trouble was a heavy infestation of the conjunctiva with immature forms of the leech *P. tesselata*: 37 were found in one young goose; from the right and left nasal cavities 29 and 20 leeches respectively were gathered and a further four from the mouth cavity. On another goose a large number of leeches were attached to the featherless skin covering the top of the head as well as to the conjunctiva.

The flock quickly recovered when removed from the pond. On a transitory inspection in September of the pond and the brook from which it was supplied no species of *P. tesselata* was found. According to zoological records *P. tesselata* is not very frequently found in Denmark. The heavy infestation registered in this case is therefore most unusual.

The literature on *P. tesselata* as a parasite is reviewed and a survey is given on the morphological structure and life-history.—Gustav Naerland (Oslo).

I. Campbell, D. H. (1938). **The Specific Protective Property of Serum from Rats Infested with Cysticercus Crassicollis.**—*J. Immunol.* **35.** 195-204. 3 tables. [4 refs.]

II. Campbell, D. H. (1938). **The Specific Absorbability of Protective Antibodies against Cysticercus Crassicollis in Rats and C. Pisiformis in Rabbits from Infected and Artificially Immunized Animals.**—*Ibid.* 205-216. 3 tables. [8 refs.]

I. The author maintained cats artificially infested with *Taenia taeniaeformis*. Estimated numbers of mature onchospheres from these were fed to healthy albino rats by stomach tube, about 85% of these numbers of parasites appearing 7-10 days later. The rats were killed 5-6 weeks later, this period allowing viable cysts to be counted on the surface of the liver.

Pooled sera from heavily infested rats (fed 10,000 onchospheres per rat) and from lightly infested rats (fed about 38 cysts per rat) were taken from groups of eight rats at intervals from 7-28 days later. These sera were tested in 1·5 c.c. amounts injected intravenously into 100 g. male rats which were dosed concurrently with 200 onchospheres. Protection was greater in the case of sera from heavily infested rats.

Minimal protective dosage with various sera was estimated in a further experiment. A "late immunity" and an "early immunity" were thereby demonstrated, the former inhibiting encystment and the latter destroying the larvae.

II. The author studied immune sera, obtained from animals artificially immunized by whole worm material (*C.c.* and *C.p.*), to determine whether new antigens were formed by the host's reaction to the organism itself and, secondly, whether new antigens might arise from the developmental activity of the parasite.

Antibody absorption tests of 11-day and 28-day sera from infected rats were made with worm suspension and worm solid (fresh larval whole worm material ground up, suspended in NaCl solution combined with the serum, and then centrifuged). Both absorption methods removed the antibodies in 11-day sera, but were without effect on the 28-day sera. In the case of rats and rabbits artificially immunized by freshly ground worm material against *C.c.*, specific absorption tests with worm material showed that antibodies were completely removed.

The author therefore considers that unabsorbable antibodies, formed as a result of active infection, are induced by antigenic substances which are probably associated with the actual growth and development of the parasite within the host.

Similar tests of sera of rabbits infested by and immunized against *C.p.* were made, and non-absorbable humoral protective substances in the sera from the infested hosts only were again demonstrated.—C. V. Watkins.

IMMUNITY

I. Jensen, K. A., Bindslev, G., Möller, S., Hansen, A., & Lind, P. (1938). **Old Tuberculin and Purified Tuberculin. Standardization. Preparation of Stable Solutions. Introduction.**—*Tubercle, Lond.* **19.** 385-397. 9 tables.

II. Jensen, K. A., Bindslev, G., Möller, S., Hansen, A., & Lind, P. (1938). **Old Tuberculin and Purified Tuberculin. Standardization. Preparation of Stable Solutions. Part II. Purified Tuberculin.**—*Ibid.* 433-446. 24 tables. [17 refs.]

I. The article records investigations to simplify the Mantoux test and studies on the stability of dilutions of purified tuberculin. The methods of standardization of tuberculin are described. The shock method is not so reliable as the intradermal test, moreover the shock and intradermal effects of tuberculin need not run parallel; both tests can be done on the same subject. In human beings and g. pigs the reacting power varies with the site employed.

Tables show results of comparative intradermal tests on students, using Seibert's P.P.D. and purified tuberculin prepared by the authors. The method of reading reactions and of testing a tuberculin against the standard are described.

As diluting agent phenol reduced potency in 14 days. With a phenol-buffer solution the duration of potency was extended, and with 0·01% quinosol instead of phenol the activity of tuberculin remained unimpaired for one month.

II. Purified tuberculin prepared according to Seibert's method from Sauton medium tuberculin was diluted using buffer solution with 0·01% quinosol. Comparative tests with varying dilutions of purified tuberculin and International Standard Tuberculin were carried out on human beings. Patients were also tested with differing dilutions of purified tuberculin and dilutions of 1 : 50,000 and 1: 500 both gave satisfactory reactions in Mantoux tests.

Difficulties encountered in the production of purified tuberculin are pointed out. Media containing iron gave a greater yield of tuberculin. For the ultrafiltration Seibert's 12-13% collodion membrane was replaced by 7% membrane, which resulted in slight loss of tuberculin but hastened dialysis. Simplified apparatus and technique for small scale production of purified tuberculin is described in detail.—J. Reid.

Feldman, W. H., & Stasney, J. (1937). **Leukemoid Response of Tuberculous Rabbits to Administration of Tuberculin.**—*Amer. J. med. Sci.* **193.** 28-38. 2 text figs., 3 figs. on 2 plates, 1 table. [Numerous refs.]

Absolute and differential white blood corpuscle counts were made in 9 rabbits injected subcutaneously with old tuberculin (10 mg. per kg. body weight) four weeks after infection with TB. (7 with the bovine type and one each with the human and avian types). Nine non-tuberculous rabbits served as controls.

It was found that the injection of tuberculin caused in tuberculous rabbits an intense leucocytosis, involving predominantly the granulocytes, though there was also a noteworthy increase of immature myelocytes which gave the blood picture a leucaemoid appearance, such as has been recorded in tuberculous human beings.

There was no leucocytosis in the controls.—J. E.

Stasney, J., & Feldman, W. H. (1938). **The Character of The Leukocytic Response to Tuberculin in Sensitised Calves.**—*Amer. J. med. Sci.* **195.** 20-27. 2 figs. [10 refs.]

The writers attempted to produce a " leukemoid " reaction in calves, a condition which they had previously [see preceding abstract] shown can be elicited in rabbits. Of eight calves six were inoculated with a virulent strain of *Mycobact. tuberculosis*, the other two being kept as controls. Blood was examined before and after infection. After eight weeks two doses of tuberculin were given intradermally into the caudal fold at intervals of seven days. Infection produced fluctuation in the leucocytic count of the 6 calves. The first injection of tuberculin provoked leucocytic increase, mainly due to neutrophiles; there was a decrease in the number of lymphocytes. The second injection of tuberculin caused over-stimulation of myeloid tissue and immature white cells were demonstrable. The blood reaction was not of the same degree as that produced in rabbits, and the writers suggest that this is because the bone-marrow of most cattle is incapable of a sudden excessively large production of neutrophiles, whereas the converse is true of rabbits.

—J. Reid.

Masch, H. (1938). Beitrag zur intrakutanen Tuberkulinisierung beim Schwein. [**Intradermal Tuberculin Testing in Pigs**].—*Inaug. Diss., Berlin.* pp. 27. 4 tables. [Numerous refs.]

M. applied the single intradermal tuberculin test to the middle of the outer surface of the ear in 134 pigs and compared the results with P.M. findings. A mixture of " bovotuberkulin " and avian tuberculin was used. Of 15 pigs showing evidence of TB. after slaughter, reactions of over 4 mm. were recorded in 12, and reactions of 2·5 mm. or less in the other 3. There were no false positive reactions. Similar tests on 31 other pigs demonstrated the reliability of the test in the 4 tuberculous animals. [No detail is given concerning the origin of the tuberculin used].—J. E.

Plum, N., & Russeff, C. (1939). **Immunobiological Studies on Brucella abortus Bang for Establishment of a Serviceable Allergic Diagnostic Means.**—*Skand. Vet. Tidskr.* **29.** 31-53. 5 figs., 2 tables. [20 refs.] [In English : Swedish summary].

A bacterium-free aqueous filtrate is prepared from *Br. abortus* cultures by freezing, thawing, grinding, extracting and filtering. The filtrate can be concentrated by adsorption with $Al(OH)_3$ or by ultrafiltration, and gives highly specific complement-fixation reactions. When injected intradermally into infected g. pigs or cattle the filtrate causes an allergic response, as evidenced by increase of skin measurements, which compares favourably with that given by other extracts, *e.g.* those used by Dubois [*V. B.* **6.** 403]. In normal animals no increase in measurements occurred. Injection of the preparation into normal g. pigs did not cause a positive agglutination reaction.—P. S. Watts.

Foshay, L., & Le Blanc, T. J. (1937). **The Derivation of an Index Number for the Opsonocytophagic Test.**—*J. Lab. clin. Med.* **22.** 1297-1300. 1 fig. [2 refs.]

In Huddleson's [*V. B.* **8.** 648.] brucella opsonocytophagic test the polymorphonuclear-leucocytes are divided into four groups, *viz*, those showing no phagocytosis, those containing from 1-20 bacteria, those showing 21-40 bacteria, and those showing 41 bacteria or over. This method is clearly cumbersome. The authors therefore set out to reduce the classification to terms of a single

figure. They give to the class of cell showing no phagocytosis a figure of –2, to the class showing phagocytosis of 1-20 a figure of –1, to the class showing phagocytosis of 21-40 a figure of +1, and to the final class a figure of +2. Fifty cells are examined and classified; the numbers in each class are then multiplied by the respective figures with due regard to sign and the total evaluated. This figure must clearly fall between –100 and +100. To obviate the necessity of using a + or – sign the –100 to +100 range is transformed by a simple process to a range of 0 to 100, –100 becoming 0 and +100 becoming 100. Actual examples are given, and a nomogram is provided for the final transformation.

This method of deriving an index number should prove of considerable value to those using the opsonocytophagic test.—F. W. Priestley.

Vellisto, E. (1938). "Agglutinationsreihe", "Zonen (Abschnitte) der Agglutinationsreihe", "Agglutinationsgefälle der Titerzone". [**Agglutination Zones**].—*Eesti loomaarstl. Ring.* **14.** 150-159. 4 tables. [In German].

This is a discussion, based on the general publications available, about the agglutination test with regard to the interpretation of the reaction and the significant titres.—Elfriide Ridala (Tartu).

Lucrezi, G. (1937). Sul potere fagocitario del sangue dei tubercolotici verso le brucelle. [**Phagocytic Action of Blood of Tuberculous Persons on Brucella**].—*G. Batt. Immun.* **18.** 643-656. 1 table. [Numerous refs.] [English, French and German summaries].

L. made an attempt to ascertain whether the blood of human beings affected with TB. would show any phagocytic action on brucella. The blood of one patient was found to agglutinate *Br. melitensis*, but blood from this patient showed no greater phagocytic power to *Br.m.* than did blood which did not agglutinate the organism.—A. J. Cassar.

van Saceghem, R. (1939). Action virulicide des ganglions lymphatiques. [**Bactericidal Action of the Lymph Nodes**].—*Ann. Méd. vét.* **84.** 67-68.

Three young bovines inoculated intramuscularly with 0·5 c.c. of a virulent culture of *Clostridium chauvoei* manifested strong local and systemic reactions. When, however, the same dose of the culture was inoculated directly into the exposed prescapular lymph node of another bovine animal, there was no reaction of any kind; when this animal was inoculated intramuscularly with 0·5 c.c. of the culture 15 days later there was only a slight local reaction. The significance of these findings in connexion with immunity in general is briefly discussed.—N. J. Scorgie.

Hertzog, A. J. (1938). **The Phagocytic Activity of Human Leucocytes with Special Reference to their Type and Maturity.**—*Amer. J. Path.* **14.** 595-603. 6 figs. on 1 plate, 1 table. [13 refs.]

In vitro tests with serum from patients affected with leukaemia, infectious mononucleosis, lymphocytosis and eosinophilia indicated that the greatest amount of phagocytosis was shown by mature polymorphonuclear neutrophiles. Monocytes, eosinophiles and metamyelocytes were also actively phagocytic. The phagocytic activity of myelocytes, promyelocytes, leukoblasts and myeloblasts was greatest in the more mature forms. Phagocytosis was observed only in a small percentage of mature lymphocytes. These results show that phagocytosis is a process not confined to any one type of cell; certain cells such as eosinophiles and

lymphocytes which ordinarily are not phagocytic may become so under certain conditions. The maturity of the cell is an important factor in determining its phagocytic ability.—N. J. Scorgie.

Marrack, J. (1939). **The Nature of the Combination between Antibodies and Antigen.**—*IV Congr. int. Pat. Comp., 1939.* **1.** 331-350. 5 tables. [Numerous refs.] [In English: French, German, Italian and Spanish summaries]. [Abst. from author's summary].

The reaction between antigens and antibodies results from the specific affinity of certain specific "determinant" groups in the antigen molecules for certain specific receptor groups in the antibody molecule. This affinity is due to intermolecular forces, similar to those binding molecules together in crystals and molecular aggregates. The specificity of this affinity is determined by :– (1) the presence of atoms or groups of atoms with appropriate electric fields of force forming active points of attraction, and (2) the proper spatial distribution of these active points.

Tomcsik, J. (1939). Funktion der kombinierten Antigene. [**Function of Combined Antigens**].—*IV Congr. int. Pat. Comp., 1939.* **1.** 437-441. [In German: English, French, Italian and Spanish summaries]. [Abst. from author's summary].

In vaccination with associated antigens some difficulties may arise on account of the fact that the maximum of antibody concentration against each individual antigen may be reached at different times. Many simple vaccines must consist of a combined antigen, since the bacterial cell is the result of several antigenic substances. Non-specific factors have a very large influence on antigen function; and many divergencies in the work of different observers is due solely to an incomplete consideration of these factors.

Petit, M. (1938). Cuti-immunité et cutivaccination dans les espèces animales. [**Skin Immunity and Skin Vaccination in Animals**].—*Thesis, Alfort.* pp. 86. [Numerous refs.]

The different forms of general immunity are described and the histology and physiology of the skin briefly outlined.

Immunization by inoculation of the skin is then discussed in general terms, the following points being considered :– mechanism, technique, rapidity of immunity and its duration, advantages and disadvantages of the skin route, and local cutaneous curative treatment by antivirus.

The second part of the thesis deals with cutaneous vaccination against coccal infections, tuberculosis, swine erysipelas, brucellosis, blackleg, foot and mouth disease, pox, rinderpest and contagious ecthyma.

DISEASES, GENERAL

Haldane, J. B. S. (1938). **Congenital Disease.**—*Lancet.* **235.** 1449-1455. 9 figs., 2 tables. [Numerous refs.]

This is a general exposition on the subject of congenital disease. H. deals with the question mainly from the genetical aspect, and includes many human pedigrees to illustrate his points. He calls attention to the need for studying the nature of the diathesis in cases of irregular inheritance, and suggests that very

important additions to the knowledge of the subject might be made by the investigation of embryos and miscarriages in cases where obscure abnormalities are at present vaguely described by the word " degeneracy ". For example, in the case of certain feet and eye defects in mice, it has been shown that among the progeny of abnormal parents every embryo was abnormal, even if it grew up into a normal mouse. He ends with a plea for a fuller appreciation of the study of genetics in the medical curriculum.—N. J. Scorgie.

Caccavella, A. (1938). Prime osservazione sulle infezioni degli animali domestici dell'Uollega.—Profilassi—Entomologia. [**Notes on Animal Diseases in Abyssinia**].—*Nuova Vet.* **16.** 104-109. 2 tables.

C. discusses his observations made during a three months' stay in the Lekemti area, Abyssinia.

The most important disease is rinderpest, and it is often complicated by piroplasmosis.

He describes his experiences with rinderpest serum and considers that simultaneous serum-virus immunization is the most satisfactory method. He discusses dipping for the control of piroplasmosis.

The following is a check-list of conditions noted in this area :– rinderpest, piroplasmosis due to *Babesia bigemina* and *B. bovis*, *Theileria mutans* infection, *Nuttallia equi* infection and trypanosomiasis caused by *Tryp. brucei* and *Tryp. theileri*. The following helminths were also found :– *Fasciola hepatica*, *Cysticercus bovis*, *Ascaris megalocephala*, and species of strongyles. Demodectic and sarcoptic mange, *Tyroglyphus* infestations, and ringworm due to *Trichophyton* occurred. Species of *Amblyomma*, *Rhipicephalus* and *Boophilus* were found as well as *Glossina morsitans* and species of *Chrysops*, *Haematopota*, *Stomoxys* and *Sarcophaga*.

Götzsche, N. O., & Plum, N. (1938). " Skin lesions "—Problemet. Tuberkuloselignende Knuder i Subkutis hos Kvaeg. [**The Skin Lesion Problem. Tuberculosis-Like Nodules in the Subcutis of Cattle**].—*Maanedskr. Dyrlaeg.* **50.** 33-54. 6 figs. [13 refs.]

Skin lesions or tuberculoid processes in the subcutis of cattle as reported in America had not been reported in Denmark before 1936. In 1936, however, Andersson [*V. B.* **9.** 142.] reported an increasing number of cases of " skin tuberculosis " in cattle since 1930 in his district on the Isle of Gotland (Sweden), and 100 typical cases were recorded in 1937. He gave an account of the infection and showed how it spreads from herd to herd when the animals are kept on common pastures.

Because of its importance for the control of bovine TB., the authors went to Gotland to study the disease, and more especially its relation to the tuberculin test. They found that (1) about 50% of the clinically affected animals reacted positively to the intradermal tuberculin test, (2) some animals with no clinical symptoms reacted positively to the test, (3) the allergic condition once established disappeared gradually, (4) the power to react diminished with repeated tests, (5) bovine tuberculin showed a slight superiority over the human type in duplicate tests applied at the same time, (6) few positive reactors to the intradermal test reacted to the subcutaneous test, and (7) that the ophthalmic test with bovine and avian tuberculin in no case gave positive reactions.

It is concluded that cattle affected with " skin lesions ", as it occurs in its typical form on the Isle of Gotland, react to tuberculin tests but not in the same manner in which animals react when infected with the bovine, human or avian type of tubercle bacilli.—Gustav Naerland (Oslo).

I. Giron, A. T. (1937). Los murciélagos, portadores del virus de derriengue. (Encéfalo-mielitis bovina). [**Derriengue (Bovine Encephalomyelitis) and Its Transmission by Bats in Mexico**].—*Rev. mex. Med. vet.* **1.** No. 5. 6-8.

II. Giron, A. T., & Camargo, F. (1938). Investigaciones en el derriengue. [**Encephalomyelitis in Cattle in Mexico**].—*Ibid.* **2.** No. 13. 3-5. [13 refs.]

I. G. states that there are increasing numbers of losses among cattle due to the spread of this disease in Mexico. He succeeded in transmitting the infection from bovines to laboratory animals and *vice versa* by means of nervous tissue (intranasally and intraocularly); saliva from affected cattle also proved infective for laboratory animals. He produced infection in g. pigs by inoculation with brain suspension of bats taken from an affected area, and believed to be of the genera *Macrotus* and *Artibeus*. G. suggests that there is some hope that the disease may be combated by vaccination, and also that an attempt may be made to exterminate the bats, should they prove to be the vectors of the disease.

II. This is a brief summary of the data obtainable on this condition. The symptoms are described [see also *V. B.* **6.** 805-806]. The infective nature of the disease has been proved experimentally; the incubation period in rabbits is six to eight days. Several strains of the virus have been isolated. Pigeons cannot be infected, but the dog is susceptible. Bodies resembling Negri bodies are demonstrable. In an outbreak at Pinotepa a number of horses were affected. Rabbits were infected by inoculation with material from the brain of infected bats; the authors suggest that the disease is transmitted by the saliva of bats to domestic animals, *i.e.* domestic animals do not infect one another. [The disease would appear to have close resemblance to the bat-transmitted rabies seen in South America; see *V. B.* **4.** 33].

Miessner, H., & Harms, F. (1939). Zur Frage des Virusabortes der Stuten. [**Virus Abortion in Mares**].—*Z. InfektKr. Haustiere.* **54.** 281-284. [2 refs.]

A reply to Oppermann [*V. B.* **9.** 568.] and a criticism of his theory that abortions in the mares discussed in that article were of nutritional origin. [No further evidence in favour of the virus theory is advanced: it is regrettable that the term "virus abortion" has been used in the literature on the cases under discussion].—J. E.

Aychet, M. (1938). Une des entérites toxiques des agneaux. (La paraplégie enzootique). [**Enzootic Paraplegia, a Toxic Enteritis, in Lambs**].—*Thesis, Alfort.* pp. 71. [Numerous refs.]

A. describes a disease in lambs which occurs in France and has been recorded by French writers under such names as meningo-encephalitis and epizootic cerebro-spinal meningitis. He suggests that the condition is an enteritis with auto-intoxication. It has a high mortality; it does not appear to be infectious, or directly due to parasites. Symptoms are varied but the passage of unformed faeces coated with mucus, pain on abdominal palpation and straining are characteristic. These symptoms may be combined with those of cerebral or locomotor disorders. Staphylococcal pustules are often present on the skin. P.M. findings include some degree of enteritis with much mucus and desquamated epithelial cells in the rectum, and distension of the rumen.—A. A. B. Ellis.

Carstens, P., & Prüfer, J. (1938). Abschliessende Untersuchungen über Verkrümmungen des Brustbeins beim Huhn, insbesondere die experimentelle Erforschung ihrer Erblichkeit. [**Curvature of the Sternum in Fowls; the Hereditary Aspect**].—*Arch. Geflügelk.* **12.** 78-94. 6 figs., 6 tables, 2 charts. [8 refs.] [English summary]. [See also *V. B.* **8.** 598].

Experiments were carried out on 580 Leghorn fowls aged six months to four years, kept in fowl houses with perches. New cases of curvature of the sternum occurred at all times within this period. The incidence was higher in heavy birds. This condition has no adverse effect on egg-laying, development, general health, length of life or fertility and should not be considered as a constitutional weakness.

K. describes matings between an unaffected cock and seven affected hens; he considers that this experiment gave evidence in support of the inheritance theory.—Sassenhoff (Münich).

Fritzsche, K. (1937). Ueber eine durch Aetzkalkverstäubung hervorgerufene hämorrhagische Laryngotracheitis des Huhnes. [**Haemorrhagic Laryngotracheitis in Fowls Caused by the Scattering of Quick Lime**].—*Berl. tierärztl. Wschr.* **53.** 607-609. 4 figs. [5 refs.]

Quick lime was scattered on land occupied by poultry with the result that many chickens died of acute laryngotracheitis, the clinical symptoms of which resembled the virus disease of this name.

Differential diagnosis was made by histological examination of the affected tissue, which in lime injury shows much exudate attached to the mucosa and extreme congestion of the capillaries of the latter. In laryngotracheitis there is intense cellular infiltration.—V. Chládek (Prague).

Lubbehusen, R. E., & Beach, J. R. (1939). **Adult Poultry Mortality of Non-Infectious Origin.**—*J. Amer. vet. med. Ass.* **94.** 209-222. 8 tables. [1 ref.]

The authors draw attention to the significance of diseases of poultry other than those of infectious origin, and their effect upon egg production on the incidence of culls (birds to be got rid of), and on their relation to mortality rates. They analyse the results of an experimental study carried over several years, with special reference to the age incidence of pathological lesions.

The birds used for these studies comprised four age groups, hatched in the April of each year from 1933-1936. The brooding conditions were ideal, and the percentage of deaths from infectious diseases was negligible. The birds were culled at 16 months, 19 months and 22 months. Birds placed on nutrition experiments, the basal rations of which were believed to supply normal requirements, were autopsied at 27 months. All culls were submitted for *ante-mortem* examination, so that records of symptomatology could be made. The autopsy data is summarized at six-monthly intervals.

During the age period of 7-12 months, in a total of 4,278 birds, the combined population of the four series during this age period, the mortality was 295 (6·9%). At P.M. examination in birds that died, lesions of visceral lymphomatosis or of lymphoid leukosis were demonstrated most frequently, followed by those of the alimentary, reproductive and urinary systems respectively. In the culls, lymphomatous infiltrations involving either the visceral organs or the nervous system represented 35·8% and 29·4% of the total respectively. Those of the alimentary, reproductive, urinary and miscellaneous groups occurred less frequently.

In the second age period of 13-18 months the average mortality was 19·3%. 988 primary pathological lesions were observed; 34·9% affected the reproductive system, 18·8% the alimentary system and 17·1% occurred as visceral lymphomatosis. 105 of the 117 lesions affecting the urinary system occurred in birds which died, whilst 41 of the 71 neurolymphomatous lesions were observed in the culls.

The mortality during the age period of 19-24 months was 11·5%. Lesions

of the reproductive system predominated (33·2% of 556 primary lesions); 24·7% were demonstrated in the alimentary system, and 16% in the urinary system; visceral lymphomatosis amounted to 14·3%. The relative incidence of various lesions in culled birds and birds which died is specified in full. In the age period of 25-30 months the mortality was 17%. Lesions of the reproductive system predominated, followed by those of the alimentary and urinary systems; lesions of visceral lymphomatosis were observed less frequently. The period of 31-36 months showed a mortality of 20%, the lesions predominating in the same relation as in the preceding period.

In the author's opinion, lesions of the reproductive system were directly responsible for unsatisfactory egg production among the birds culled at 16 months. The authors point out that control of infectious diseases is not in itself sufficient to reduce the high incidence of mortality, and the need for further study of genetic, nutritional and general husbandry factors is indicated.—C. V. Watkins.

Besredka, A., & Gross, L. (1939). Epithélioma expérimental de l'estomac. Immunisation par voie intracutanée. [**Experimental Brown-Pearce Epithelioma in the Stomach. Immunization by Intradermal Inoculation**]. —*Ann. Inst. Pasteur.* **62.** 253-259. 1 fig. [4 refs.]

It was found possible by injection into the stomach wall of rabbits of a fresh emulsion of Brown-Pearce carcinoma to induce in all cases a malignant tumour which in 13 animals gave rise to metastases. The region selected was the prepyloric area and the lesser curvature. This type of tumour has now been successfully implanted in the stomach, skin, subcutaneous tissues, peritoneum, testes, eye and brain of rabbits.

The fact that the regression of a particular type of tumour is usually followed by a high degree of resistance to the development of a further tumour of the same type, led the authors to try the effect of the injection of tumour emulsions into the stomach wall of rabbits in which regression of a skin neoplasm of the Brown-Pearce type had previously occurred. In 11 out of 12 animals no neoplasm developed at the site of inoculation, whereas in 32 control rabbits which had not previously developed skin tumours followed by regression, all except one showed a carcinoma of the stomach wall.—E. G. White.

Stasney, J., & Feldman, W. H. (1938). **Leukemic Lymphoblastoma in a Calf: a Hematologic and Histologic Study.**—*Amer. J. Cancer.* **34.** 240-247. 5 figs. [6 refs.]

Detailed haematological studies were made for a period of three weeks on a three-months-old calf with generalized enlargement of all lymph nodes. During this period three biopsies were carried out on superficial lymph nodes; the animal was finally destroyed when extremely emaciated and a detailed autopsy was carried out.

There was a definite correlation between the immature lymphocytes found in the peripheral blood and the cellular picture in the diseased lymph nodes. At autopsy, proliferation of cells (lymphocytes and reticulum cells in varying proportions) was found in the lymph nodes, liver, spleen and bone-marrow. The histopathological picture was similar to that seen in lymphatic leucaemia in man and indicated a neoplastic process in which secondary invasion of the blood had occurred. In addition, in some of the lymph nodes the changes were suggestive of lymphosarcoma. The term "leucaemic lymphoblastoma" is put forward as most suitably describing the condition.—E. G. White.

Buss, W. (1938). Leukämie bei einem Kalb. [**Leucaemia in a Calf**].—*Tierärztl. Rdsch.* **44.** 735-736.

Records of leucaemia in the calf are rare. In the case described, lesions were found in the liver and myocardium in addition to involvement of all the lymph nodes.—E. G. White.

McIntosh, J., & Selbie, F. R. (1939). **Further Observations on Filterable Tumours Induced in Fowls by Injection of Tar.**—*Brit. J. exp. Path.* **20.** 49-63. 3 text figs., 27 figs. on 6 plates, 2 tables. [16 refs.]

An extension of previous work by McIntosh [(1933). *Brit. J. exp. Path.* **14.** 422.], and the history is given in detail of the tar-induced tumours in fowls mentioned in that paper. The authors induced four new tumours by the injection of tar into the breast muscles of Plymouth Rock hens. Two of these were transmitted repeatedly in serial passage by Berkefeld filtrates; one, a non-filtrable tumour, could be passed by means of emulsions and another by means of minced tissues only.

The histological and biological characteristics and the filtrability of the various original tar tumours and their passage tumours are described in detail; the histological description is aided by the use of numerous plates; biological characteristics given include the transmissibility, rate of growth, tendency to form metastases, etc.

The authors conclude from their work that an active virus can be demonstrated in a large proportion of chemically-induced, connective-tissue tumours in the fowl. —L. E. Hughes.

NUTRITION IN RELATION TO DISEASE

I. Askew, H. O. (1939). **Cobalt Deficiency at Glenhope, Nelson, New Zealand.** —*N.Z. J. Sci. Tech.* **20.** 302A-309A. 1 fig., 6 tables. [4 refs.]

II. Askew, H. O. (1939). **Successful Use of Cobalt Salts for Pasture Topdressing in the Treatment of Stock Ailment at Glenhope, Nelson.**—*Ibid.* 315A-318A. 1 fig., 3 tables. [2 refs.]

I. This paper records further work on bush sickness at Glenhope, Nelson. In groups of hoggets receiving acid extracts and iron-free extracts of Nelson soil, and cobalt drench, the onset of bush sickness was prevented. Control sheep, however, and a fifth group receiving hydrochloric acid, developed the disease and a number succumbed. It was concluded that bush sickness on the granite-derived soils at Glenhope is due solely to a deficiency of cobalt.

The results of blood examinations, analysis of drenches, cobalt status of pastures and livers are given.

II. Bush-sick sheep were restored to health and were subsequently maintained in health for an extended period when "depastured" on a previously "sick" area which had been topdressed annually with cobaltized superphosphate, providing 2 lb. cobalt chloride per acre. The cobalt content of the pasture was markedly increased by the application of cobalt chloride at the above rate. Chemical data for cobalt in the case of a pasture on the Marsden Research Farm treated with cobalt chloride at the rate of 4 ounces per acre suggest that the 2 lb. application used in the experiment was unnecessarily large and probably could be reduced with safety.—L. W. N. Fitch.

Hove, E., Elvehjem, C. A., & Hart, E. B. (1938). **Arsenic in the Nutrition of the Rat.**—*Amer. J. Physiol.* **124.** 205-212. 5 tables, 1 chart. [16 refs.]

Experiments on the effect of As upon nutritional anaemia of rats show that

if As is essential during the rapid growth period or for Hb building, the requirement is met by the 2γ per day, furnished by 50 ml. milk, and that addition of As at levels of 1 and 5γ per day had no effect on growth, Hb levels, R.B.C. levels or blood fragility of rats on a mineralized milk diet.—ALFRED EDEN.

I. LYONS, M., INSKO, W. M., Jr., & MARTIN, J. H. (1938). **The Effect of Intraperitoneal Injections of Manganese, Zinc, Aluminium and Iron Salts on the Occurrence of Slipped Tendon in Chicks.**—*Poult. Sci.* **17.** 12-16. 3 tables. [Numerous refs.]

II. CLIFCORN, L. E., ELVEHJEM, C. A., & HART, E. B. (1938). **The Development of a Ration for the Study of Perosis in Chicks.**—*Ibid.* 28-32. 3 tables. [9 refs.]

III. WIESE, A. C., ELVEHJEM, C. A., HART, E. B., & HALPIN, J. G. (1938). **Studies on the Prevention of Perosis in the Chick.**—*Ibid.* 33-37. 2 tables. [9 refs.]

I. With the diet used the intraperitoneal injection of 12·9-30·9 mg. of manganese to day-old chicks over a period of seven weeks prevented slipped tendon, whereas the injection of similar quantities of zinc, aluminium and iron had no protective action. Retardation of growth resulted in the case of chicks receiving 30·9 mg. manganese, but those injected with 15·45 mg. showed some increase in growth rate over the control and other injection groups. Zinc caused some retardation in growth at all levels of injection.

II. Experiments to find a satisfactory basal ration for the production of perosis in chicks led to the adoption of one consisting of 69 parts kidney-dextrin mixture, 14 parts crude casein, 2 parts brewers' yeast, 2 parts cod-liver oil, 3 parts $Ca_3(PO_4)_2$, 5 parts alcoholic extract of rice bran, and five parts of a salt mixture. The addition of the alcoholic extract of rice bran was necessary for the prevention of encephalomalacia.

III. The addition of 15% of rice bran to the basal ration [described in II above] completely prevented perosis in chicks, as also did the addition of a 0·0025 and 0·005% of manganese, but with another ration containing higher levels of Ca and P, 15% of rice bran and the addition of 0·005%, 0·0025% and 0·05% of manganese were ineffective. The perosis-preventing factor in rice bran was destroyed by autoclaving, and was not extracted by 95% alcohol, 1% H_2SO_4, or concentrated glycerol.

The inorganic and ester P of the blood of chicks on the basal ration was unchanged, but the total blood P of the chicks on the ration plus manganese was lower than that of chicks on the basal ration alone or of those receiving the rice bran supplement.—R. ALLCROFT.

WIESE, A. C., JOHNSON, B. C., ELVEHJEM, C. A., HART, E. B., & HALPIN, J. G. (1939). **A Study of Blood and Bone Phosphatase in Chick Perosis.**—*J. biol. Chem.* **127.** 411-420. 4 tables, 2 charts. [20 refs.]

The average blood and bone phosphatase activity of chicks with perosis was 8·3 and 4·7 units respectively while that of non-perotic birds was 22·6 and 9·1 units respectively. Chicks fed on the same perosis-producing diet but with a supplement of 50 p.p.m. of Mn did not develop perosis and had an approximately normal phosphatase activity as compared with the phosphatase activity of chicks fed a normal grain ration. When a diet high in Ca salts other than the phosphate was fed, the phosphatase activity was lowered and a high incidence of perosis occurred, but the decreased activity was not as great as when high amounts of inorganic P were fed.

From *in vitro* experiments it was observed that the addition of PO_4 or Ca ions to the enzyme markedly decreased its activity, and addition of Mn restored the activity, but this activation depends on the amount of Mn and PO_4 ions present; the higher the PO_4 concentration the more Mn is necessary to activate the enzyme.

The phosphatase activity was estimated by a slight modification of the method of King and Armstrong.—R. Allcroft.

I. Krupski, A. E., Hungerbühler, F., & Almasy, F. (1937). Untersuchungen über den Calcium-Phosphorstoffwechsel lecksüchtiger Tiere der Braunviehrasse und über therapeutische Erfolge mit Vitamin D. III Mitteilung. [**Ca : P Ratio of Swiss Brown Cattle with Pica; Treatment with Vitamin D. III.**]—*Schweiz. Arch. Tierheilk.* **79.** 355-368. 1 table, 1 chart. [11 refs.] [See also *V. B.* **7.** 631].

II. Krupski, A. (1938). Beitrag zur Frage der klinischen Anwendung des D-Vitamins. [**The Use of Vitamin D in Veterinary Medicine**].—*Ibid.* **80.** 307-316. 2 figs., 1 table.

I. A slight variation in the Ca content of the blood serum and a fall in the inorganic P to a third of the normal ratio were found in animals affected with pica. In 24 hours' excretion of urine of an affected cow, the urine P content was 40 times higher than normal; in another cow equally affected there was no variation in the urine P content. With one exception, all animals treated intravenously with a vitamin D preparation recovered, and lactation increased. After six days' vitamin treatment a retention of 62 g. of Ca and of 54 g. of P was observed. Simultaneously with the diminution of the symptoms of pica the animals regained their normal sexual cycle, having lost it during illness.

II. Bovines 6-18 months old stunted and affected with pica, osteomalacia and osteoporosis, recovered their general health after two intravenous injections of 600,000 international units of vitamin D, at an interval of 3-5 weeks. Older animals were given up to one million I.U. The vitamin treatment should be accompanied by a bone-meal or a mineral salt ration and grazing in sunlight and fresh air.—Hans Graf (Zürich).

Danckwortt, P. W., & Hotzel, J. (1937). Chemische Untersuchungen von Heuproben aus Lecksuchtgebieten. [**Analysis of Hay from Pica Areas**]. —*Dtsch. tierärztl. Wschr.* **45.** 701-705. 4 tables. [Numerous refs.]

The authors analysed 19 samples of hay from pica areas in Schleswig-Holstein, comparing them with good meadow hay from Hanover. A table shows the results of the tests for ash, $Al_2O_3+Fe_2O_3$, Fe, Al, Ca, Mg, P and Cl. The pica area hay did not differ from the Hanover hay appreciably, only having a low Ca content in some cases (0·15% as against 0·5%).

In a further test the Cu content of the hay was estimated, but no apparent deficiency was found (0·36-1·19 mg.%); the same applied to the S content.

Tests for organic matter are also described, but were judged to be unsatisfactory as the hay samples had become dry and pulverized.—J. E.

Kiiver, H., & Kaarde, J. (1938). Ulevaade senistest uurimistest veiste soohaiguse selgitamiseks. [**Research on Pica in Cattle in Estonia**].—*Eesti loomaarstl. Ring.* **14.** 33-70. 8 tables. [Numerous refs.] [German summary].

The problem of pica in cattle became of pressing importance following the formation of new land settlements on moorland; the disease had, however, formerly been observed in the older established farms elsewhere. One affected cow which was purchased for observation was killed and the following pathological

changes were seen :– chronic catarrhal abomasitis and enteritis, fatty degeneration of the liver and obstructive jaundice, congestion of the kidneys, hypertrophy of the heart muscle, and atrophy of the thyroid gland.

Soil and water from the affected area were analysed, but no particular mineral or other deficiency was ascertained, though mineral deficiency in general was suspected.—Elfriide Ridala (Tartu).

Bradfield, Dorothy, & Smith, Margaret C. (1938). **The Ability of the Dog to Utilize Vitamin A from Plant and Animal Sources.**—*Amer. J. Physiol.* **124.** 168-173. 1 table. [1 ref.]

An experiment is reported from which it appears evident that vitamin A fed as cod-liver oil, or as its precursor, carotene, in oil or as carrots, is almost equally well utilized by the dog. A level of 20 international units of vitamin A per 100 g. body weight, either from animal or vegetable sources, appeared ample for normal growth in puppies and permitted slight storage in the liver. Greater intakes of vitamin A resulted in proportionately greater storage. At the high levels of intake there was no weight gain advantage in the puppies but their general condition was better. The minimum vitamin A requirements of the dog are estimated at 15 I.U. per kg. body weight.—N. J. Scorgie.

Lamoreux, W. F., & Hutt, F. B. (1939). **Breed Differences in Resistance to a Deficiency of Vitamin B_1 in the Fowl.**—*J. agric. Res.* **58.** 307-316. 2 figs., 1 table. [10 refs.]

In each of four experiments the ability of White Leghorn chicks to survive on a diet deficient in vitamin B_1 was greater than that of Rhode Island Reds. The mean age at death was lowest for chicks which never received any normal feed and highest for those which had been on normal feed to two and three weeks of age, but in each experiment the mean age at death was higher for the White Leghorns than for the Rhode Island Reds. Also the variation in susceptibility among individuals, as measured by the range in age at death, was much greater in the former than in the latter. The superior resistance of the White Leghorns to this dietary deficiency was shown to be independent of body size and was not caused by differential mortality from causes other than polyneuritis.—R. Allcroft.

Dam, H., Glavind, J., Bernth, O., & Hagens, E. (1938). **Anti-Encephalomalacia Activity of *dl*-α-Tocopherol. [Correspondence].**—*Nature, Lond.* **142.** 1157-1158. [3 refs.]

Daily doses of *dl*-α-tocopherol, increasing proportionally to the weight of the animals in quantities of 0·0075 mg. per g. body weight per day, completely protected chicks against encephalomalacia. In another experiment in which a basal diet containing less fat was used, it was observed that the growth of the chicks was stimulated by addition of *dl*-α-tocopherol. Several authors agree that there is a fat-soluble and a water-soluble form of the anti-encephalomalacia factor and from the experimental observations it seems that the fat-soluble form is either identical with, or may be substituted by, the synthetic vitamin E : further it should be possible to standardize vitamin E in fats by means of the anti-encephalomalacia activity.—R. Allcroft.

Thomas, B. H., & Cannon, C. Y. (1937). **Reproduction on Rations Free from Vitamin E.**—*Proc. Amer. Soc. Anim. Prod. 1937.* pp. 59-63. 1 table.

Seven goats and their progeny were fed on a ration adequate in all respects except for vitamin E for 4½ years, during which period no unusual difficulty was

experienced in expanding the original herd of seven to 48. Since all matings were successful in producing young it is concluded that neither male nor female goats require vitamin E in the ration to ensure reproduction. But male rats reared on the same ration were completely sterile at 7 and 8 months of age, while the female rats went through initial resorption gestations typical of vitamin E deficiency.—R. ALLCROFT.

ALMQUIST, H. J., MECCHI, E., & KLOSE, A. A. (1938). **Estimation of the Anti-haemorrhagic Vitamin.**—*Biochem. J.* **32.** 1897-1903. 1 fig., 4 tables. [6 refs.]

Data are presented which show that the blood-clotting time of the chick varies with the age and the vitamin K reserve in the chick, and the vitamin K level in the ration, and tends to reach a maximum at two weeks of age; at 3 weeks of age the chick achieves a balance of blood-clotting power with respect to the vitamin K level in the ration.

An improved assay procedure for vitamin K is suggested.—R. ALLCROFT.

PUBLIC HEALTH

SCHMIDT, J. (1936). Erkrankungen bei Menschen nach Genuss von Milch einer euterkranken Ziege. [**Illness in a Family Drinking Milk from a Goat with Mastitis**].—*Berl. tierärztl. Wschr.* **52.** 438-439.

A whole family was taken ill with gastro-intestinal symptoms after drinking coffee containing milk from a goat with a mixed infection of staphylococci and streptococci. It is supposed that preformed toxin was the cause.—P. S. WATTS.

FLEISCHHAUER, G., & HERMANN, G. (1938). Ueber weitere Erfahrungen mit der Abortus-Bang-Ringprobe (ABR.) bei der Untersuchung von Milchproben auf Abortus Bang. [**The Ring Test for the Diagnosis of Brucella Infection in Milk**].—*Berl. tierärztl. Wschr.* June 10th. 333-334. [5 refs.]

A comparison of the ring agglutination test with the standard tube and slide methods for the diagnosis of brucella infection in milk. [It cannot be stressed too strongly that these tests do not give any certain indication of the presence or absence of infection in milk. Such tests merely indicate that the cows producing the milk are strong positive reactors to the agglutination test and that it is probable that a proportion of them may be infected with *Br. abortus* in the udder].—E. J. P.

THERAPEUTICS

I. NEUMANN, C. Z. (1938). **Treatment of Undulant Fever with Prontosil.**—*Brit. med. J.* Aug. 13th. 342-344. 1 table.

II. DALRYMPLE-CHAMPNEYS, W. (1938). **The Prontosil Group in *Br. abortus* Infections. [Correspondence].**—*Ibid.* Aug. 27th. 471.

III. ANON. (1938). **Sulphanilamide in Undulant Fever.**—*Lancet.* **235.** 901. [6 refs.]

IV. BRITTON, C. J. C. (1938). **The Effect of Sulphonamide Compounds on Certain Bacteria *in vitro*.**—*Brit. J. exp. Path.* **19.** 140-143. 2 tables. [1 ref.]

V. WELCH, H., WENTWORTH, J. A., & MICKLE, F. L. (1938). **The Use of Sulfanilamide in the Diagnosis and Treatment of Brucellosis.**—*J. Amer. med. Ass.* **111.** 226-231. 3 figs., 3 tables. [11 refs.]

NEUMANN found that in cases infected with *Br. melitensis* and which had been

treated with prontosil *per os*, the average duration of the fever was seven days (except in one case in which the drug was ineffective). Untreated cases become free of fever in 2-6 months. Dalrymple-Champneys obtained beneficial effects in half of his cases of *Br. abortus* infection treated with prontosil or sulphanilamide. Montgomerie [*V. B.* **8.** 729.] in Britain and Chinn [*V. B.* **9.** 338.] in the United States have both reported favourably on the effect of sulphanilamide treatment in g. pigs experimentally infected with *Br.a.* or *Br. suis.* Britton could demonstrate no deleterious effect of sulphanilamide on *Br.a. in vitro.* Welch, Wentworth and Mickle, however, found that in human beings suffering from undulant fever and in g. pigs infected with *Br.a.* the phagocytic activity of the white blood cells is increased by the administration of sulphanilamide, and believe that the drug stimulates the opsonic power of the blood.—J. M. Robson.

I. Velu, H., Zottner, G., & Belle, G. (1938). Le naganol peut être employé sans danger dans la prophylaxie de la dourine. [**Use of Naganol in the Prophylaxis of Dourine**].—*Arch. Inst. Pasteur Algér.* **16.** 389-402. [2 refs.]

II. Colin. (1938). Contribution à l'étude de la dourine ; son traitement par le novarsénobenzol billon. [**Treatment of Dourine by Novarsenobenzol Billon**].—*Bull. Acad. vét. Fr.* **11.** 177-180. [4 refs.]

III. Cordier, G., & Ménager, J. (1938). Le novarsénobenzol dans le traitement de la dourine. [**Treatment of Dourine with Novarsenobenzol**].—*Bull. Soc. Path. exot.* **31.** 490-493.

I. After complaints that the prophylactic injection of naganol (0·0035 g. per kg. body weight) at ten days' interval caused serious trouble among native asses in Morocco, the authors submitted Moorish donkeys to repeated doses of the drug ranging from 0·0035 g. to 0·14 g. per kg. body weight. At the same time they kept the urine and blood under observation, noting especially the changes in the sugar and albumin contents ; the results are recorded, together with the results of P.M. examination of the kidneys.

With the lower doses, even after 36 injections, no harmful effect was to be observed clinically, but a transient hypochloruria and albuminuria were noted. The large doses caused more serious renal trouble, indicated by pronounced albuminuria and hypochloruria, which eventually caused death.

II. As judged by apparent return to health and by the formol gel test, two clinically diagnosed cases of dourine in stallions weighing 440 and 370 kg. were cured by the intravenous injection of 15 g. novarsenobenzol, given as a 0·1% solution on two successive days. The daily dose was divided into three parts and given at intervals of half an hour.

III. Novarsenobenzol is considered superior to naganol for the treatment of dourine, as only two injections are necessary, the blood is immediately sterilized, and no serious symptom of poisoning followed in two Pyrenean donkeys given therapeutic doses.—G. Williamson.

Kolmer, J. A., & Rule, Anna M. (1939). **Sulfanilamide in the Treatment of Experimental Trypanosomiasis of Rats.**—*Proc. Soc. exp. Biol., N.Y.* **40.** 77-79. 2 tables. [1 ref.]

Sixteen rats were each inoculated with approximately 500,000 *Trypanosoma equiperdum.* Six intravenous injections of 0·08-2 g. sulphanilamide were administered to 12 of the rats during the next 78 hours. All died of trypanosomiasis in four to five days. Three uninfected control rats which were given the same treatment survived. Similar results attended oral administration of the drug, which proved ineffective in all cases.—D. D. Ogilvie.

Faure-Brac. (1939). La chimiothérapie aurait-elle vaincu la leishmaniose ? [**Control of Leishmaniasis by Chemotherapy**].—*Bull. Acad. vét. Fr.* **12.** 64-76. [5 refs.]

Canine leishmaniasis affects some 15% of dogs in the Mediterranean coastal districts of France. Of some 2,000 infected dogs treated with antimony during the previous 15 years only 2·5% of them were completely sterilized. These were all young animals treated in the primary stages of infection. Some 200 dogs showed signs of antimony intolerance and treatment was abandoned. The remainder showed improvement, but relapses occurred in from 1-14 months. Treatment with a new pentavalent antimony preparation, aminophenylstibinate, is described and it is stated that with the use of this drug larger doses of antimony can be used with less risk of accident. Local and general improvement is more rapid, the total number of injections necessary are reduced and complete cures are possible. In a series of 250 dogs which have now been treated, no local abscess formation was observed. Injections should be made every five days. The toxic dose for a dog of 20 kg. is 20 g. and the dosage recommended varies with the weight of the animal, but is less than one tenth of the toxic dose. A number of cases which were treated are described.—S. J. Gilbert.

Manwell, R. D., & Haring, Ann T. (1938). **Plasmochin and Atebrin Therapy in *Plasmodium vaughani* Infections.**—*Riv. Parassit.* **2.** 207-218. 24 figs. on 1 plate, 4 tables. [17 refs.] [In English : French, German and Italian summaries]. [Transl. from French summary].

In observations on 53 birds inoculated with infective blood, the authors observed the striking susceptibility of *P. vaughani* to plasmochin and " atebrin " ; they studied the morphological changes in the parasite.

Bégué, P. (1938). Traitement de la piroplasmose du chien par le " Zothélone." [**Treatment of Canine Piroplasmosis with " Zothélone "**].—*Thesis, Toulouse.* pp. 53. [Numerous refs.]

In searching for a drug which could be effectively employed against piroplasms and which would be free from the disadvantages of the agents already in use, Cuillé, Darraspen and Florio [*V. B.* **8.** 248.] made experiments with " zothélone " [dimethylquinolylmethyl sulphate urea]. B. reports the results obtained with " zothélone " on dogs affected with *Babesia canis* infection.

The drug generally caused the piroplasms to disappear within a few hours, and at the latest within 24-48 hours. Relapses occurred, but were few. Toxic symptoms arose if, following a too concentrated dose of the drug, the parasites were destroyed too quickly. " Zothélone " could be given subcutaneously without fear of undue local reaction, and a therapeutic dose could be repeated in 24 hours if necessary. It caused no discoloration of the patient's urine. B. recommends the following subcutaneous doses :– for dogs over 10 kg., 20 c.c. of 0·025% solution ; for smaller dogs, 10 c.c., and for very small dogs, 7-8 c.c. Contrary to the experience of others, B. noted no sensitization of the parasite or exaggerated reaction in the patient when these doses were repeated after a fortnight's interval.—G. W.

Jörg, M. E. (1936). De la coccidiosis de los conejos de laboratorio. Contribución para su terapéutica. [**Chemotherapy of Rabbit Coccidiosis**].—*8th Reun. Soc. argent. Pat. reg. N.* **2.** 1042-1051. 2 figs. [8 refs.]

J. states that he obtained good results in the treatment of rabbit coccidiosis by chinosol given *per os*. [The article is unconvincing].

Rischmüller, H. (1937). Versuche zur Behandlung verschiedener ektoparasitärer Erkrankungen bei Pferd u. Rind mit Derrophen, dem standardisierten Derrispräparat der I.G. Farbenindustrie. [**Treatment of Ectoparasitic Infestations of Horses and Cattle with "Derrophen"**].—*Inaug. Diss., Hanover.* pp. 37. 12 tables. [Numerous refs.]

R. describes in detail his tests of a derris wash on 115 horses and cattle. It was effective against both ringworm and mange, and also against lice, at a concentration of 3%; higher concentrations were not more effective. The preparation is claimed to be entirely harmless to the animals, provided it is not applied directly to mucous membranes.

Harwood, P. D., Habermann, R. T., & Jerstad, A. C. (1939). **Efficacy of Commercial Phenothiazine in the Removal of Roundworms from Sheep.**—*Vet. Med.* **34.** 440-443. 1 fig., 1 table. [7 refs.]

Trial of this product was made upon ten cull ewes and rams shown by faecal examination to be infested with various species of round worms. After the administration, the faeces were examined daily for the presence of worms, particularly *Bunostomum* and *Chabertia*, until none was found; the animals were then killed and examined P.M. The product was given in the food and was found to be efficient when given in a dose of 0·5 g. per lb. body weight.—W. J. Ironside.

Baker, D. W., Danks, A. G., & Britton, J. W. (1939). **Treatment of Trichostrongylosis in Foals.**—*Cornell Vet.* **29.** 238. 1 table.

Six foals, in which trichostrongylosis was diagnosed by faecal worm egg count and larval culture, were treated with a solution containing 1% of copper sulphate and nicotine sulphate. As determined by faecal worm egg count the treatment was shown to be highly efficient.—W. J. Ironside.

Baker, D. W. (1939). **A New System of Anthelmintic Control for Gastro-Intestinal Parasites of Ruminants.**—*Cornell Vet.* **29.** 192-197. 2 figs., 2 tables. [6 refs.]

The treatment described consists in spraying the pharynx or swabbing the mucous membrane of the mouth with a strong solution of copper sulphate and then administering a dose of a mixture of equal parts of tetrachlorethylene and mineral oil. Particulars are given of the application of the treatment to a group of seven calves, and the results as assessed by faecal worm egg counts showed that the treatment was successful.—W. J. Ironside.

Wehr, E. E., Harwood, P. D., & Schaffer, J. M. (1939). **Barium Antimonyl Tartrate as a Remedy for the Removal of Gapeworms from Chickens.**—*Poult. Sci.* **18.** 63-65. 1 table. [4 refs.]

Affected chicks were made to inhale the substance by placing them in a glass jar together with the powder and keeping the powder agitated by means of bellows. Three to five chicks were treated at a time and were exposed to treatment for periods up to ten minutes. Some 140 chicks were so treated, and the results showed that the treatment was highly efficient.—W. J. Ironside.

Potemkina, V. A. (1937). Diagnostika i terapija gimenolepidoza (Hymenolepis lanceolata) guseĭ. [**The Diagnosis and Treatment of Hymenolepidosis *H. lanceolata* Infestation of Geese.**—*Papers on Helminthology, Commemorating 30 Year Jubilee of Prof. K. I. Skrjabin.* pp. 529-541. 7 figs., 2 tables. [9 refs.] Moscow: Lenin Acad. Agric. Sci.

The authors carried out experiments to assess the value of arecolin, a product spoken of as " philitselene ", male fern extract, kamala and copper sulphate for the treatment of *Hymenolepis* infestation in geese. Arecoline was found to be the most effective ; it was given in doses of 0·002-0·0025 g. per kg. bodyweight after fasting. " Philitselene " and male fern extract also gave good results but they are very toxic, and have to be followed by a saline purgative. Diagnosis of infestation was made by examining the faeces for ova.

GAULIER, C. (1938). Contribution à l'étude des génalcaloïdes en médecine vétérinaire. [**Genalkaloids in Veterinary Medicine**].—*Thesis, Alfort.* pp. 65. [Numerous refs.]

The author made observations on the use in canine medicine of three genalkaloids, genostrychnine, genomorphine, and genoscopaline—modifications of the alkaloids as defined by POLONOVSKI [many references, *e.g. C. R. Acad. Sci., Paris.* **181.** 887.],—with a view to demonstrating that while they retain the therapeutic properties, the toxic effects of the alkaloids are much reduced. He describes experiments carried out.—R. ISHERWOOD.

STRASSL. (1938). Das Sterilitätsproblem und Abortosan E. [**The Treatment of Sterility with "Abortosan E "**].—*Berl. Münch. tierärztl. Wschr.* July 8th. 397-400. [8 refs.]

S. gives the results of his treatment of 75 sterile cows or heifers with "Abortosan E ", a vitamin E (wheat germ oil) preparation. Favourable results are claimed for 68 cases and S. concludes that the preparation merits further trial. He discusses the conditions in which sterility arises.—V. CHLÁDEK (PRAGUE).

POISONS AND POISONING

GINEITIENE, E. (1937). Apie gyvuliu apsinuodijimus sarmais ir rukśtimis ir ju sukeltus patologinius pasikeitimus. [**Poisoning of Livestock by Caustic Alkalis and Acids**].—*Vet. ir Zootech., Kovno.* **14.** 361-366. [4 refs.]

A general description of the lesions caused by acid and alkali poisoning, with no new material.—A. PABIJANSKAS (KAUNAS).

PEIRCE, A. W. (1938). **Observations on the Toxicity of Fluorine for Sheep.**—*Bull. Coun. sci. industr. Res. Aust.* No. 121. pp. 35. 3 text figs., 17 figs. on 6 plates, 6 tables. [Numerous refs.]

Phosphatic licks are widely used for sheep in Australia, bone-meal and dicalcic phosphate being chiefly employed. Although the giving of phosphatic licks to sheep is by no means a proved necessity, it appears that their use is likely to continue. It is desirable therefore to employ a cheaper and more abundant source of phosphorus than either bone-meal or dicalcic phosphate. This has led to the use of ground rock phosphates from Nauru Island or Ocean Island. The principal objection to these materials lies in their fluorine content (2·7 %).

Extensive experiments showed that sheep which received 120 mg. or less of F daily grew normally, ate the same amount of food, and remained in good health throughout the experimental period of three years. The food consumption of sheep receiving 160 mg. F as Nauru rock phosphate and 170 mg. F as Florida phosphate was 45 % and 60 % respectively of that of controls, and the corresponding percentages for their weights at the end of the experiment were 55 and 70.

Ingestion of F did not reduce wool growth. Doses of 60 and 120 mg. F had no effect on the physical appearance of the bones. Higher doses brought about replacement of normal colour by a white, chalky appearance, and the walls of the bones became thickened, and in extreme cases exostoses appeared on the long bones. The mandibles also showed exostoses and increase in diameter. Sheep receiving 60 mg. or more F showed changes in the teeth roughly proportional to the amount ingested. The enamel of the incisors and molars was pitted and the latter teeth displayed abrasions, which may, in some cases, have been an important factor in lessened food consumption in sheep receiving 160 mg. and 170 mg. F daily. The changes in teeth and bones are illustrated in photographs. Ingestion of F had no definite effect on the ash content of bones, but the F content was increased ten times or more. F intake caused incisors to erupt at an earlier age. One adult sheep, fed 500 mg. F daily, developed exostoses of long bones and mandibles, but the teeth were not affected. Intermittent ingestion of F by one sheep resulted in increases in weight and food consumption during periods without F, indicating that intermittency of intake, as occurs in the consumption of licks under ordinary conditions of husbandry, may be a factor in reducing the toxicity of F for sheep.

It is considered that the lowest dose of F used, 60 mg. daily, probably exceeds the amount which a sheep is likely to consume in the form of a phosphatic lick (*e.g.* 60% rock phosphate and salt).—H. McL. Gordon.

I. Calvery, H. O., Laug, E. P., & Morris, H. J. (1938). **The Chronic Effects on Dogs of Feeding Diets Containing Lead Acetate, Lead Arsenate, and Arsenic Trioxide in Varying Concentrations.**—*J. Pharmacol.* **64.** 364-387. 1 fig., 4 tables. [Numerous refs.]

II. Laug, E. P., & Morris, H. P. (1938). **The Effect of Lead on Rats Fed Diets Containing Lead Arsenate and Lead Acetate.**—*Ibid.* 388-410. 2 figs., 8 tables. [8 refs.]

III. Morris, H. J., & Wallace, E. W. (1938). **The Storage of Arsenic in Rats Fed a Diet Containing Calcium Arsenate and Arsenic Trioxide.**—*Ibid.* 411-419. 4 tables. [14 refs.]

IV. Morris, H. P., Laug, E. P., Morris, H. J., & Grant, R. L. (1938). **The Growth and Reproduction of Rats Fed Diets Containing Lead Acetate and Arsenic Trioxide and the Lead and Arsenic Content of Newborn and Suckling Rats.**—*Ibid.* 420-445. 1 fig., 11 tables. [12 refs.]

V. Grant, R. L., Calvery, H. O., Laug, E. P., & Morris, H. J. (1938). **The Influence of Calcium and Phosphorus on the Storage and Toxicity of Lead and Arsenic.**—*Ibid.* 446-457. 2 figs., 5 tables. [13 refs.]

VI. Lightbody, H. D., & Calvery, H. O. (1938). **Variations in the Arginase Concentrations in the Livers of White Rats caused by the Administration of Arsenic and Lead.**—*Ibid.* 458-464. 4 tables. [10 refs.]

VII. Calvery, H. O. (1938). **Chronic Effects of Ingested Lead and Arsenic. A Review and Correlation.**—*J. Amer. med. Ass.* **111.** 1722-1728. [Numerous refs.]

I. On an experiment to study the chronic effects of Pb and As separately and together, dogs of various ages were fed on a standard diet supplemented by various levels of added lead arsenate, lead acetate and arsenic trioxide. At the levels employed no animals died after receiving As and there was no difference in toxicity between Pb fed as the acetate and as the arsenate. Analysis of the soft tissues and various parts of the skeleton showed the greatest Pb retention was in the skeleton, with high levels also in kidney and liver. Under these conditions

the Pb storage in the femurs was 60% greater in the ends than in the shafts, and also greater in the cortex than in the medulla of the kidneys, whereas distribution throughout brain and liver was uniform. A newly-born pup from a dam receiving Pb showed a much higher Pb content than one from a control, showing evidence of maternal transmission, whilst the milk Pb was higher in Pb-fed dams. One dog receiving 2·56 mg. Pb per kg. bodyweight died within 15 days, whereas two others at a level of 0·33 mg. survived 140 and 167 days respectively. Survival differences were related to the age of the dogs, younger animals being the much more susceptible to Pb poisoning. Increasing the Ca content of the diet considerably reduced the susceptibility to Pb poisoning and its retention within the body. Considerable individual variation existed amongst the animals in respect of rate and severity of appearance of symptoms and in the amounts of Pb retained in different parts of the body.

II. Rats were put on to a diet adequate in all known food constituents and litter-mates on to the same diet supplemented by 3·53 mg. added Pb (as the arsenate) per kg. food. Male rats receiving Pb showed a lower growth rate than male controls, but female rats showed no significant differences. Storage of Pb was greater in the femurs, liver, kidneys, brain, hair and the whole body of Pb-fed animals than in controls. Ingestion of lead acetate over 6-7 weeks as 213 mg. Pb per kg. body weight caused marked increases in the weights of kidney and spleen, roughly paralleled by the Pb storage in these organs. Pb balance studies on ingested Pb were carried out and over 98% of the Pb was accounted for. The Pb content of the liver was surprisingly low, in disagreement with the general belief that the liver is an important Pb storage organ.

III. Rats were fed on the diet mentioned in II supplemented by 215 mg. As per kg. diet either as calcium arsenate or as arsenic trioxide. In the calcium arsenate series the live-weight gains were greater in As-fed rats than in controls, but there was no difference in the As_2O_3 series. Large quantities of As were stored on these diets, the liver and kidneys storing by far the largest amounts per g. of dry weight. Statistical analysis showed that in the calcium arsenate series the livers were significantly greater and the brains smaller than in controls. The statement that pentavalent As (as calcium arsenate) has a greater tendency to be retained in the body than trivalent As (as As_2O_3) receives a striking confirmation, the differences in As storage in some organs between calcium arsenate and As_2O_3-fed rats being greater than 200%.

IV. No significant difference in fertility and fecundity was noticed in rats fed a control diet compared with those on the same diet supplemented by 64 and 512 mg. Pb (as the acetate) per kg. food or by 26·8 and 215 mg. As (as As_2O_3), nor were there any differences similarly between control and experimental groups in the F_1 generation. The maternal transfer of both Pb and As to the foetus was demonstrated, the newly born on the lower Pb level containing 8 times and those on the higher level 40 times as much Pb as the newly born of control rats. At both levels of As feeding there was less As in the first litter of the first generation than in any of the later litters.

V. Rats were reared on basic diets, one high in Ca and low in P and the other low in Ca and high in P (differing however in fat and protein contents), to which were added known amounts of Pb as the arsenate. At the end of 93 days, surviving animals were analysed for Pb and As. The growth rate on the higher Pb and As levels was slower, especially on the low Ca diet, and the analyses showed that, in contrast to the generally accepted teaching, much more Pb was stored in the bodies of those rats on the low Ca diet than on the high, the reverse picture holding true for As. The experiments, as designed, were not able to give a decided answer to

the question as to whether low P or high fat increased the Pb storage in those animals on the high Ca low P diet.

VI. Rats to which daily subtoxic doses of Pb or As were given intraperitoneally showed a lower arginase content of the liver than that of untreated control animals. Those animals which ingested small quantities of Pb daily mixed with the food were found unable to respond to prolonged fast by increases in the liver arginase concentration as occurs in normal rats. By feeding small quantities of Pb and As to the mothers, suckling rats were found to have a lower liver arginase content than of those rats whose mothers had been fed on a control diet.

VII. A general review of the above.—Alfred Eden.

Forbes, J. C. (1939). **Studies on the Prevention of Liver Cirrhosis [From Acute Carbon Tetrachloride Poisoning] by the Subcutaneous Injections of Xanthine-Containing Preparations.**—*J. Pharmacol.* **65.** 287-293. 4 figs. [5 refs.]

Groups of rats, with adequate controls, were treated with subcutaneous injections of 50 and 100 mg. sodium xanthine per 100 g. body weight, with pure xanthine in strict suspension, and with crude liver preparations containing 50% xanthine, and exposed intermittently to CCl_4 vapour over a period of 9-11 weeks. In all cases the development of liver cirrhosis was prevented or greatly retarded in the treated rats, affording evidence of the protective action of xanthine against CCl_4 poisoning. Crude liver preparations freed from xanthine are apparently almost as effective in protection, and attempts have been made to isolate the substances responsible, but beyond qualitative tests little has been done to elucidate the possible nature of this substance.—Alfred Eden.

Dowgiatto, J. (1938). Zmiany w morfologicznym obrazie krwi koni przy zatruciu fosgenem oraz łacznośc ich z niektórymi objawami klinicznymi. **[Changes in the Blood Picture and Clinical Picture of Horses Poisoned by Phosgene].**—*Wiad. weteryn.* **17.** 402-417. 7 figs., 2 tables. [Numerous refs.] [French summary].

Severe poisoning of horses with phosgene is followed by definite changes in the blood, valuable for early diagnosis during the latent stage; these blood changes correspond with the clinical signs. In the first phase (during the first hour after exposure) there is a decrease of the haemoglobin (71%), a slight decrease of the number of erythrocytes (6·1 millions) and also of leucocytes and lymphocytes; the blood cell sedimentation rate is accelerated and also the pulse and respiration rate, and the temperature is slightly increased. In the second stage (24 hours after exposure) there is an increase of the haemoglobin (up to 117%), the number of erythrocytes is raised (up to 13·8 millions per c.mm.) and of the leucocytes (up to 14,400 per c.mm.); the sedimentation rate attains 139 mm. in 24 hours, the respiration 60 and the pulse 80 per minute; the temperature is 2·3° C. above the normal. During the third stage in animals that recover (6 days after exposure) there is a gradual return to the normal, except that the temperature remains a little high. During the illness neutrophiles are prevalent, whereas the number of eosinophiles and lymphocytes is markedly lower.—V. Chládek.

Biester, H. E., & Schwarte, L. H. (1939). **Moldy Corn Poisoning (Leucoencephalomalacia) in Horses with History of Previous Attack as well as Recovery from Virus Encephalomyelitis.**—*N. Amer. Vet.* **20.** No. 6. 17-19. 2 figs.

In the field the differential diagnosis of mouldy corn poisoning and virus

encephalomyelitis in horses is often difficult. Local conditions and the season of the year etc. are of some help, but for a correct diagnosis the brain must be submitted to a histological examination. In a case described, there was a history of previous attacks of both encephalomyelitis and mouldy corn poisoning. Typical changes of the latter disease only were present in the brain, and consisted of perivascular and diffuse oedema, haemorrhages and liquefaction necrosis; there was no cellular reaction typical of virus encephalomyelitis.—N. J. Scorgie.

PHYSIOLOGY

Yoffey, J. M., & Drinker, C. K. **The Lymphatic Pathway from the Nose and Pharynx. The Absorption of Dyes.**—*J. exp. Med.* **68.** 629-640. 5 figs., 2 tables. [10 refs.]

As a result of the statement that Type III pneumococci instilled into the nose of rabbits could often be found within an hour in the lymph nodes of the cervical region, these experiments on the cervical lymphatic pathway were undertaken in an attempt to discover the possible means by which the infection spreads from the naso-pharynx.

The experiments were performed on 1 monkey, 14 cats, 2 dogs, and 6 rabbits. A cannula was inserted into the cervical (tracheal) lymph duct after exposure in the lower third of the neck near its junction with the venous system. A solution of T-1824 or trypanblue, in physiological saline, was then instilled into the nose. In the cat, rabbit and monkey the dye appeared in the cannula from 15-30 minutes after instillation, in the dog after 1 hour. The concentration of the dye was weak at first, but it quickly increased to a constant level. In three cats hydrokollag (a fine suspension of graphite) was used but no evidence could be found of its entry into the lymph stream.

Although the dyes could be traced along the vessels of the nasopharynx to the superior cervical lymph node, by observation during the experiment and on subsequent dissection, no trace was ever found in the interior of the cranium, except in one case when a slight discoloration of the olfactory bulb was noticed. Results of this kind must depend to some extent on the nature of the solution used, as it is significant that workers who claim to have demonstrated passage *via* the nasopharynx used a solution of potassium ferrocyanide. The size of the animal must also be considered, as it is conceivable that the extra thickness of the cribriform plate in a large animal would be more resistant to the passage of dye.—C. W. O.

Conrad, R. M., & Scott, H. M. (1938). **The Formation of the Egg of the Domestic Fowl.**—*Physiol. Rev.* **18.** 481-494. [Numerous refs.]

A useful review of recent work dealing with the formation of the fowl's egg. The following aspects are discussed:—the formation of the ovum and its yolk in the ovary, the mechanism of ovulation and its relation to light and to endocrine factors, the formation of the egg-white, and the formation and composition of the shell and shell membranes.—N. J. Scorgie.

MISCELLANEOUS

Graham, R., & Sampson, J. (1938). **Animal Pathology and Hygiene.** pp. 133. Numerous figs. Springfield, Illinois: Department of Agriculture. [8vo].

A series of 60 lessons for agricultural students on animal physiology, hygiene and disease.—J. E.

HAMMOND, J. (1938). **Report on the Organization of Animal Research in New Zealand.**—*N.Z. J. Sci. Tech.* **19.** 762-783. 1 appendix.

[H. was invited to New Zealand by the Department of Scientific and Industrial Research to survey the requirements and facilities for research into problems of animal production and to prepare a report embodying suggestions for the organization of an Animal Research Bureau to control such research work in New Zealand.]

I.—SOME PROBLEMS OF ANIMAL RESEARCH IN NEW ZEALAND

The problems which appear to call for investigation are grouped under six headings :–

(*i*) *Survey Problems.*

A survey is required of the causes of wastage in the dairying sheep and pig industries.

(*ii*) *Genetical Problems.*

It is necessary to develop such practical applications of our genetical knowledge as the " progeny test " which is applied to dairy cattle. Suggestions are made for genetical observations on various species of stock.

(*iii*) *Fertility Problems.*

(a) *Sheep.*—Investigation of influence of management (feed and location) on fertility of ewes. Rams should be tested by semen examination before turning out with ewes.

(b) *Dairy cattle.*—Survey of conditions under which bull sterility occurs. Use of artificial insemination to increase progeny of " proven sires ".

(*iv*) *Nutritional Problems.*

(a) Mineral deficiencies.

(b) Grazing and stocking problems.

(c) Critical times for controlling the plane of nutrition.

(*v*) *Meat Problems.*

Problems affecting production of required quality of meat are reviewed.

(*vi*) *Disease.*

The most important diseases of stock are outlined.

II.—REPORT ON THE ORGANIZATION OF AN ANIMAL RESEARCH BUREAU IN NEW ZEALAND

(*i*) *The Constitution of the Animal Research Bureau.*

Hammond recommends the formation of an Animal Research Bureau under the auspices of the Department of Scientific and Industrial Research. The personnel should include representatives of the Cawthron Institute, the Agricultural Colleges at Lincoln and Palmerston North, the Department of Agriculture and of farming and marketing organizations having an interest in animal production ; the Bureau would be under the chairmanship of the Director-General of Agriculture. The Department of Scientific and Industrial Research should appoint two men of outstanding ability in the animal industry or related sciences. An executive committee of not more than five members should be elected by the Bureau to draw up plans of work for submission to the Bureau and to deal with urgent administrative matters arising between meetings. The secretary should be employed by the Department of Scientific and Industrial Research and be an *ex officio* member of the Bureau without a vote.

(*ii*) *Duties of the Animal Research Bureau.*

These are summarized under the following headings :– (a) to regulate the allocation of all funds for the purpose of animal research ; (b) to survey the needs of the animal industry for research work from time to time and appoint specialist workers' committees (to report back to the Bureau) on any problems of importance

which they considered required solution ; (c) to co-ordinate the work going on in the different research institutes ; (d) to receive annually programmes of work for the following year from the Directors of research institutes ; (e) to receive a short annual report from each worker in the research Institutes ; (f) to inspect periodically the research institutes ; (g) to approve the grading and selection of staffs for the research institutes ; (h) to have the power to assist financially special investigations, other than those at research institutes, having relation to problems under consideration by the Bureau, and (i) to take active steps to encourage and support co-operation with similar work in other countries.

(*iii*) *Localization of Animal Research Institutes.*

It is suggested that research institutes to deal with problems of breeding, feeding and management of stock be formed at Massey and Lincoln Colleges, and one to investigate diseases of stock at Wallaceville.

(*iv*) *The Staffing of Animal Research Institutes.*

It is recognized that research workers should be as free as possible from all regulatory, administrative and teaching duties, and should have permanence of appointment. Suggestions are made regarding recruitment, training and remuneration of staff.

(*v*) *Organization of Animal Research Institutes.*

To each research institute a Director should be appointed, capable of leading a team of research workers drawn from various branches of sciences.

An attempt should be made to elucidate the scientific principles involved in a particular problem before an immediate remedy is sought. In this way results capable of wide general application may be expected.

(*vi*) *" Getting Over " Results to the Farmer.*

In order to achieve this the formation of an "Advisory Division " in the Department of Agriculture is recommended. Officers of this Division should have special knowledge of some particular phase of animal production or animal management and should be suited by their training for the district in which they are to function. They should have no regulatory duties to perform. Their duties would be to " Synthesize the results of research work into the best of practical management."

III.—Observations on Animal Research Work in Connexion with the Future Possibilities in the Marketing of Animal Produce

The author discusses three subjects under this heading. The first is (1) whether the main pig exports are to be sent as pork or as bacon. He feels that it would be to New Zealand's advantage to concentrate on the production of pork in which she holds first place on the London market, rather than of bacon, for which the competition on the London market is much keener and in which field she ranks only about sixth in quality among countries exporting to England. The second is whether the marketing of butter as from tuberculosis-free cows is envisaged. The third question is considered particularly important ; it is whether any policy of preventing deterioration, *i.e.* erosion or loss of fertility of back-country sheep-breeding areas is contemplated. At present fat lambs produced on the low, flat lands tend to be rather too heavy and fat for the London market. Improvement of the back-country would increase the supply of lambs to the feeding areas, enable these lambs to get down earlier in the season and be got out at lighter weights.—L. W. N. Fitch.

Young, D. (1938). **Pig Breeding and the Bacon Industry in Denmark.**—*Vet. J.* **94.** 408-416. 5 figs. on 3 plates.

A general account of the industrial side of pig production in Denmark.—R. F.

OFFICIAL AND OTHER REPORTS

GREAT BRITAIN. (1939). **Twenty-Eighth Report of the Development Commissioners Being for the Year Ended the 31st March 1938.** pp. 184. London: H.M. Stat. Off. [8vo] [3s.]

Of the sum placed at the disposal of the Commissioners in 1937-1938, £46,427 was expended on veterinary research institutes and organizations by annually recurring or special grants, and £56,019 on animal genetics, animal nutrition, dairy research, helminthology, pig husbandry, poultry research and animal breeding. The veterinary institutes were:– the Institute of Animal Pathology, Cambridge; the Research Institute of the Royal Veterinary College, London; the Foot and Mouth Disease Research Committeé, and the Animal Diseases Research Association of Scotland. Short accounts of the administration and finance of the research institutes are given. In addition to the sums mentioned above, grants are made for advisory work, including veterinary science, at various colleges and universities.

For research and administrative expenses at the Field Station established for the purpose of providing better facilities for the study of animal diseases and other subjects, the Agricultural Research Council received a grant of £60,000.

A grant of £6,000 was made for new buildings at the Royal (Dick) Veterinary College, Edinburgh.

The investigations in progress at the institutes supported by the grants of the Development Fund are described in reports issued by the Departments and reviewed in reports of the Agricultural Research Council.

One studentship for research in animal pathology and two studentships for poultry research were awarded.—J. C. WALLACE.

NEW ZEALAND. (1938). **Twelfth Annual Report of the Department of Scientific and Industrial Research, 1937-1938.** pp. 128. Numerous tables, 1 map. Wellington: Govt. Printer. [fcp.]

Continued work on cobalt conclusively demonstrated its value for the prevention and cure of bush sickness. Particulars are given of tests at various localities. Cobalt is being incorporated in superphosphate fertilizer for use on cobalt-deficient land.

It has been decided to set up an Animal Research Bureau subordinate to the Council, for the purpose of fostering research on animal industry, health and disease: the organization was still under discussion in 1938 [see special report on p. 808].

Research work was carried out in Canterbury Agricultural College on:– foetal development of lambs, ewe mortality (milk fever and sorrel poisoning in ewes) and lamb mortality (clover poisoning, pulpy kidney disease, and internal parasites). Details are not given.

At the Dominion Laboratory 9,416 milk samples were analyzed and some of them examined for effectiveness of pasteurization by the phosphatase test. Only a few were below standard.—L. W. N. FITCH.

ESTONIA. (1935). Loomatervishoiu osakond. [**Estonia: The Work of the State Veterinary Service, 1934-1935**].—*Valitsusasutiste tegevus 1934-1935.* pp. 81-82. 1 map.

During the year steps were taken for the effective control of BOVINE TUBERCULOSIS and BOVINE BRUCELLOSIS, four veterinary inspectors being engaged on this

work. 9,684 cases of SWINE ERYSIPELAS were diagnosed: serum treatment was employed to a large extent. The mortality from the disease was 6-7%. RABIES gave some trouble and to control it all the dogs in the country are registered and taxed and stray dogs killed. No cases of GLANDERS, F. & M. DISEASE or SWINE FEVER were notified during the year.

The country was divided into 95 veterinary divisions, of which 78 were manned by divisional veterinarians. These officers take part in the state control of diseases and also do private practice. In addition there were veterinarians appointed to 10 districts, 14 towns, 4 frontier posts and 4 abattoirs.

—ELFRIIDE RIDALA (TARTU).

KOLBE, F. (1939). Bericht über die Tätigkeit des Kaiser-Wilhelm-Instituts für Lederforschung in Dresden und über wichtige in ihm ausgeführte Forschungen. [**Report of the Kaiser-Wilhelm Institute for Leather Research in Dresden**].—*Z. Fleisch- u. Milchhyg.* **49.** 121-123.

The institute's most important task is the prevention of damage to hides both before and after slaughter of the animal and for that it relies upon intensive dissemination of information on the subject.—G. WILLIAMSON.

POLAND. (1938). Sprawozdanie z działalności wydziału weterynaryjnego Państwowego Instytutu Naukowego Gospodarstwa Wiejskiego w Puławach za rok budżetowy 1937-38. [**Report on Work Done During 1937-1938 by the Veterinary Department of the Polish National Institute of Rural Economy, Pulawy**].—*Pam. pańs. Inst. nauk. Gosp. wiej. Puławy.* No. 2. pp. 4-13. 1 table. [French summary]. [Suppl. to *Wiad. weteryn.* **18.** No. 223].

This is just an index, partly statistical, of work done, together with notes concerning the staff.

BOOK REVIEWS

CHALMERS, C. H. [B.Sc. (Edin.), N.D.A. Formerly of the University, Leeds]. (1939). **Bacteria in Relation to the Milk Supply. A Practical Guide for the Commercial Bacteriologist.** pp. xii+209. 31 text figs., 8 figs. on 2 plates, 2 tables. [Numerous refs.] London: Edward Arnold & Co. [2nd Edit.] [8vo] [6s.]

Although this compact little book is intended primarily as a guide to the bacteriologist engaged in the wholesale milk trade it contains much which will interest public health workers and veterinary surgeons interested in the milk industry.

It is written in two parts. The first part gives a survey of the methods used in taking samples of milk and water, and the bacteriological examination of milk and water supplies and a guide to the examination of methods of production, processing and bottling milk. A useful chapter is included dealing with taints in milk due to bacterial contamination and foods and taints due to the action of various metals.

The second part of the book gives a very brief description of the microscope, its use and bacteriological technique.

It is essentially a work dealing with the production and distribution of "clean" milk rather than with the subject of disease-free milk.—H. E. BYWATER.

ROGER, H., & POURSINES, Y. (1938). Les méningo-neurobrucelloses. [**Brucella Infection of the Nervous System**]. pp. 248. [Numerous refs.] Paris: Masson et Cie. [8vo] [Fr. 45].

This book is an extensive study of brucellosis as it affects the brain, meninges and nervous system of human beings, and is based on various published observations. The neurological complications due to both *Br. melitensis* and *Br. abortus* are becoming increasingly recognized and the descriptions given are held to apply to infection with any type of brucella. A few quoted experiments on small animals afford additional evidence of neurotropism.—S. J. GILBERT.

VIRTANEN, A. I. [Professor at the Technical University, Director of the Biochemical Institute, Helsinki]. (1938). **Cattle Fodder and Human Nutrition. With Special Reference to Biological Nitrogen Fixation.** pp. 108. 24 figs., 31 tables. [Numerous refs.] London: Cambridge University Press. [8vo] [7s. 6d.]

This book contains four very interesting and informative lectures which the author delivered in Great Britain in November, 1937, and, as the full title indicates, their scope is extensive. The central purpose, however, is to show how improved nutrition of the human population in Finland depends on improved winter nutrition of the dairy cow, how this, in turn, depends on the efficient production and conservation of leguminous crops, and how the national exploitation of these crops requires a thorough understanding of the symbiosis of legumes and nitrogen-fixing bacteria, and of the principles which underlie silage-making.

Lectures I and II are concerned with the chemistry and physiology of biological nitrogen-fixation and the symbiosis of legumes and intranodular bacteria.

In Lecture III, the author points out that the vitamin A deficiency of certain Finnish winter diets would be removed if the vitamin A content of winter milk could be raised to the summer level. He demonstrates how this object, as well as economies in feeding, can be achieved by adequate use of the A.I.V. legume silage in the rations of dairy cows.

In Lecture IV, he explains how the need for greater use of protein-rich legume crops and the well known difficulties of ensiling these crops led to a series of investigations which finally established the basic principle of silage-making, *viz*, that the pH of the fodder mass must be reduced as quickly as possible to 4·0. The practical development of the A.I.V. method of silage-making is described, the main feature being the addition of mineral acids of 2N strength to the fodder as it is ensiled, coupled with careful consolidation to prevent the development of moulds.

Data are drawn from a comparative feeding trial and from the foods fed to dairy stock on two selected farms to illustrate the use and economy of A.I.V. legume silage in the feeding of dairy cows. On the two farms in question, the feeding of A.I.V. silage rendered the purchase of protein concentrates unnecessary, and the average yields of milk exceeded 700 gallons per lactation.

Experience in Great Britain does not entirely substantiate the high claims which the author makes for his process, and there is a tendency to prefer the molasses method. Nevertheless, the process has been very widely adopted in Finland, and providing adequate attention is paid to detail the A.I.V. process is the most certain method of producing silage of high nutritive value from protein-rich crops, and the most efficient of all ensilage processes in conserving the carotene content of the original crop.

Although the author emphasizes the value of A.I.V. silage from the standpoints of human nutrition and economy in cattle feeding, its outstanding significance for the health of farm animals will be especially noted by veterinarians.—W. R. M.

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The latest list of the publications indexed for this purpose was included in *Index Veterinarius,* Vol. 6, No. 1 (issued December, 1938) and also circulated with the *Veterinary Bulletin,* Vol. 9, No. 1.

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IMPERIAL BUREAU OF ANIMAL HEALTH,
NEW HAW, WEYBRIDGE,
SURREY, ENGLAND.

Printed in Great Britain
by
H. R. Grubb, Ltd., Croydon.